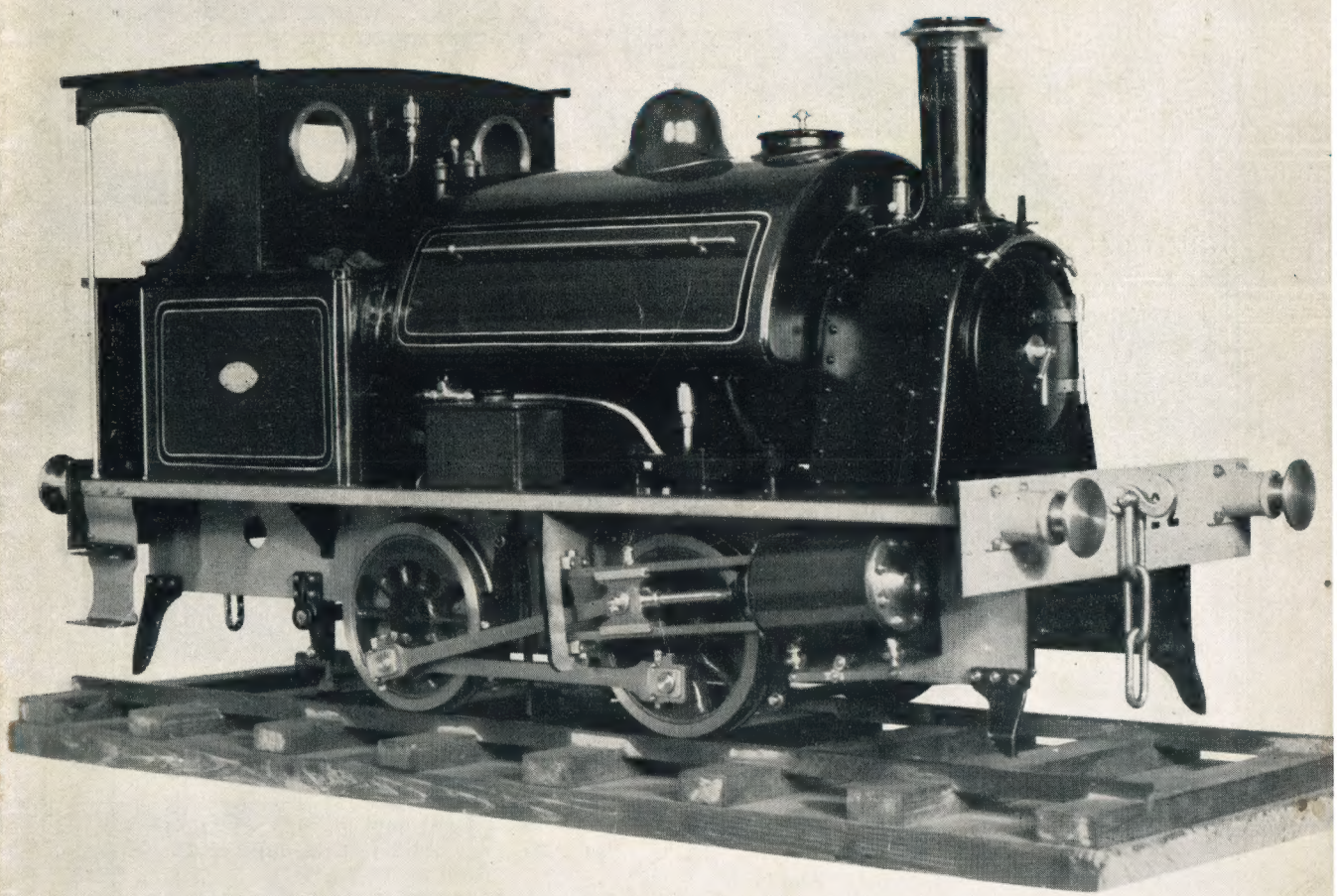
THE MODEL ENGINEER



IN THIS ISSUE

● A STEAM LAUNCH WITH TRIPLE EXPANSION ENGINE
MACHINING WORM GEARS ● A SENSITIVE BENCH DRILL
● A SCALE MODEL POWER PRESS ● READERS' LETTERS
MODEL POWER BOAT ASSOCIATION — 1955 REGATTA LIST

MARCH 17th 1955
Vol. 112 No. 2808
9D

THE MODEL ENGINEER

EVERY THURSDAY

Volume 112 - No. 2808

MARCH 17th - 1955

ESTABLISHED 1898

PERCIVAL MARSHALL & CO. LTD. 19-20 NOEL STREET · LONDON · W.1

CONTENTS

Our Cover Picture

Mr. W. G. Dennis, of Harlesden, has submitted the photograph reproduced on the cover of this issue. As many of our readers are already aware, Mr. Dennis specialises in the construction of models of industrial saddle-tank locomotives, and this one, his latest, was built, to 1½-in. scale, from some drawings kindly supplied by Robert Stephenson & Co. Ltd., Newcastle upon Tyne. The model is a fairly close copy of the prototype, which works at a London power station; it took Mr. Dennis 3½ years spare time to build, and is now in the Science Museum, South Kensington.

SMOKE RINGS

Duke of Edinburgh Trophy Judges

WE ARE pleased to announce that the panel of judges appointed to judge the entries for the Duke of Edinburgh Trophy at this year's "M.E." Exhibition will consist of:

Chairman, Professor A. M. Low; from the Society of Model and Experimental Engineers, Mr. K. N. Harris; from the Society of Model Aeronautical Engineers, Mr. C. S. Rushbrooke, and from the Guild of Model Shipwrights, Mr. W. H. Honey.

An International Atmosphere

A GLANCE through this issue will reveal the widespread interest which THE MODEL ENGINEER enjoys; for among the articles there is one from America, one from Tasmania and one from Canada. Quite an international atmosphere! We would add that we are always pleased to hear from our readers overseas and to learn what they are doing and how they do it.

The "M.E." Does It Again!

IN OUR issue for December 2nd last, we published a letter from Mr. John Pickles, of Barnoldswick, dealing principally with a broken engine shaft. About a fortnight later, we received a letter from Mr. Walter Taylor, of British Columbia, whose father, it seems, was a native of Barnoldswick. Mr. Taylor enclosed a letter addressed to Mr. Pickles and requested us to forward it. It recalled a number of incidents and referred to certain personalities associated with Barnoldswick more than half a century ago, but often mentioned by Mr. Taylor's father.

On March 1st, we received a further letter from Mr. Taylor, thanking us for putting him in touch with Mr. Pickles; the latter, it seems was able to answer Mr. Taylor's questions in considerable detail, and remarks, incidentally, that he believes he is the only man alive who *could* have done so!

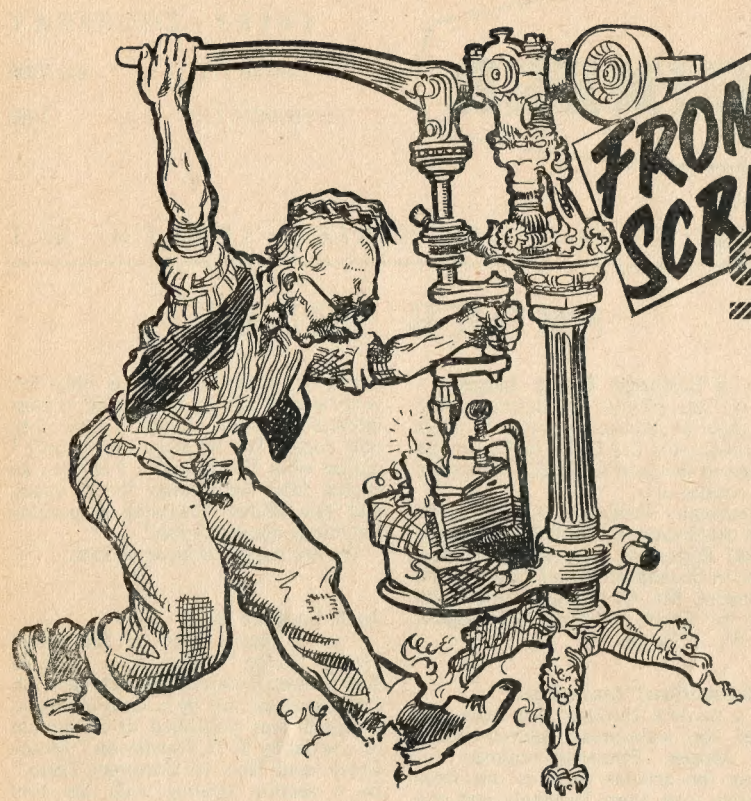
Mr. Taylor comments: "It is surely an interesting circumstance that through the medium of THE MODEL ENGINEER I was able to get in touch with someone having a knowledge of events I've heard my father speak of, and happened nearly 60 years ago. It is only five years since I started subscribing to your interesting paper, though I have seen odd copies for 50 years or so, and I realise what I've missed. I've been an engine fitter and turner for 48 years, and THE MODEL ENGINEER is teaching me things about my job."

We are happy to have obliged.

As It Used To Be!

IN A recent issue of *The Motor Cycle*, "Ixion" refers to a copy of THE MODEL ENGINEER for February 1st, 1902, sent to him by a correspondent, in which was published an instalment of a serial by T. H. Hawley on "Motor Cycles and How to Construct Them." In a section dealing with the tool equipment which should be carried by motor cyclists, the following items were recommended: "One complete exhaust valve; ground to fit; ditto, inlet; densimeter; ammeter; insulated wire; bare copper wire, 16-gauge (for beating into washers); tyre repair outfit; stout brown tape; emery flour; guttapercha tissue; can of lubricating oil; can of petrol; can of best engine oil; nuts, screws and washers; dose measure (for oil); large and small screwdrivers; two adjustable spanners; cutting pliers; scissors; knife; smooth file; parallel pliers; special box and pin spanners; emery cloth; cotton waste; asbestos cord; small tin of graphite paste; ditto of vaseline." Mr. Hawley, however, suggested that on short local runs, some of the stuff could be left at home!

Many of our older readers can testify that Mr. Hawley's advice was quite sound in its day, and several readers constructed motor cycles to his designs with reasonably satisfactory results. Motor cycles have progressed a long way since those days, and many riders set out light-heartedly on long journeys in the confidence that few, if any, tools or accessories will be required; but the elimination of mechanical worries may not have been an entirely unmixed blessing, as the old-time rider learned to take an interest in the mechanism of his machine, and acquired a great deal of mechanical skill, which is often notably lacking in present-day Knights of the Road.



A SENSITIVE DRILL

By

B. Terry Aspin

THIS article describes the facts and some of the fancies of making a comparatively up-to-date version of a quarter-inch capacity sensitive drilling machine; all within the precincts of the somewhat inadequate home workshop to which I lay claim. Although the wording of the heading appears in the singular, two machines were, in fact, produced side by side and there they appear together, new, bright and shiny, in Photograph No. 1. Mild-steel stock, Allen screws and ball-bearings are imported. For the rest, from the drawings onwards, they owe their being entirely to the aforementioned facilities and to the acquisition of a fair quantity of ferrous, non-ferrous and light alloy scrap. As many times before, the castings are amateur foundrywork and there is none which cannot be poured from a No. 3 crucible or machined on a 3½-in. lathe.

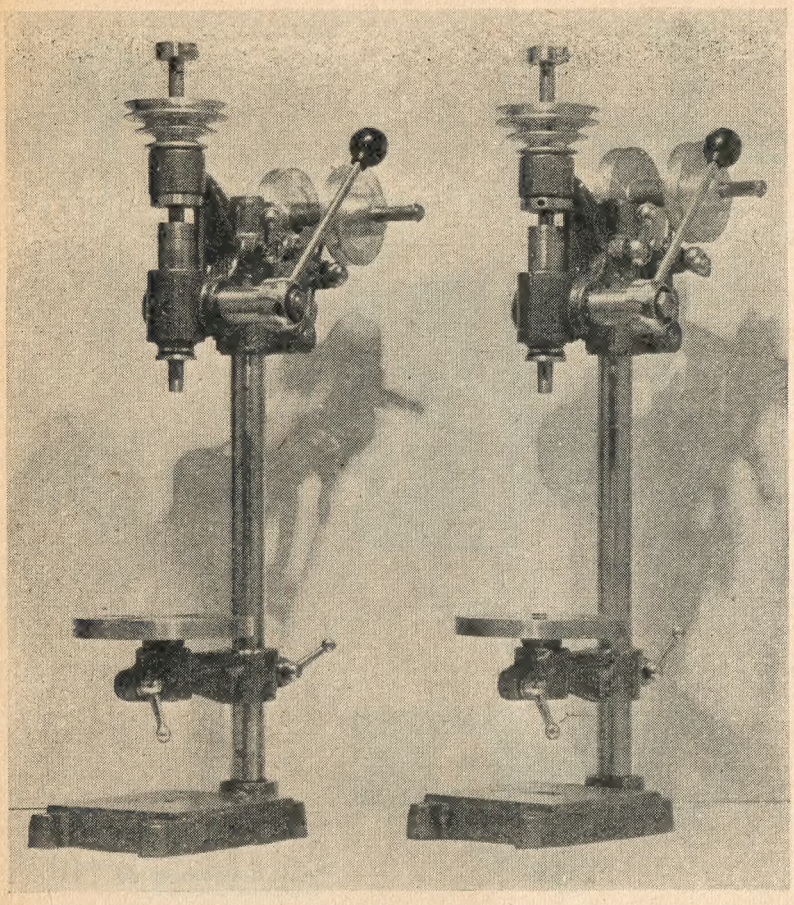
Before getting down to brass tacks, however, perhaps a word or two about the fine, precision drilling machine pictured, in action, above. Readers will, perhaps already, have noted its finer points: such as delicately balanced feed lever, sturdy trunnion, ball thrust and so on, to say nothing of the adequate provision for lubrication. There is no doubt that the example shown has provided nothing if not an extreme test of the foundryman's skill and, for the artistic among us, there is an absolute *wealth* of intricate ornament, carried out in a tasteful mixture of Louis XIV and neo-Doric.

From a functional point of view, attention is drawn to the handy clamping device, combined with height adjustment for the work, leaving both hands free for operation (an undoubted asset in this case) and to the close illumination when drilling fine holes. The machine excels in the production of large oval or polygonal holes in wrought-iron, at a drill speed of five to eight revolutions per minute with a feed thrust of, roughly, nine stone.

This type of appliance enjoyed great popularity around the year 1320, when they were ordered in large numbers by Members and Associates of the (then newly formed) Societie-Loyale and Antedeluvianne—for ye Prevention of Crueltie to Modelle Engineers. Since that day and in ye passage of tyme (I shall have to cut *this* out, I can see !) they have become scarce so that any reader now requiring a drilling machine is reduced to the necessity of either purchasing one of inferior modern design, or, where funds will not allow —or fancy takes—making the tool for himself. Thus, to anyone interested in the latter possibility, whatever the motive, I say " read on ! "—and may all his bores be parallel !

In this case the plan originated as an idea for making use of the other end of a motor spindle driving someone else's small lathe and, in the beginning, was visualised as something small—perhaps in light alloy—a simple-to-construct (whip it together in a couple of days !) type of job. There is nothing much to making a drilling machine in any case, is there ?—or *is* there !

The first lines on a clean sheet of cartridge paper, however, were preceded by a good deal of thought, so that the original conception of something easy to make died without the chance to draw breath. In this respect I feel that I have much in common with the majority of the amateur engineering fraternity in that, keen as we are to make something in our own way, satisfaction is completely absent if the thing is not worth while—each, of course, in accordance with his own particular way of thinking and his own estimate of that quality. Thus, the very miniature machine envisaged gave place to one of adequate, ¼ in., capacity; the aluminium castings surrendered to those of iron; a projected direct lever feed replaced by a quill and an adjustable boring table added; all in a mental vision. By the time pencil and paper eventually came together, the formulated design included innovations, if not improvements, of my own; but that is for the reader to judge. For the rest, the decision to build two machines, instead of one, springs from the belief that a duplicate can often be made at the same time as the original for a good



Photograph No. 1. Twins!

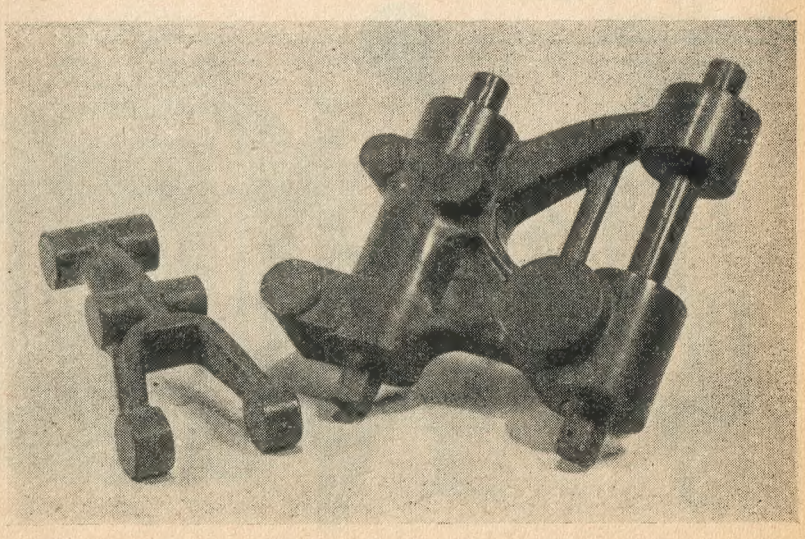
deal less than double the effort! In any case, it is not so many years since I paid out eight or nine of my hard-earned nikker for a comparable machine, so that an extra one at little cost can only be regarded as an asset.

Quite clearly there can be little claim to originality in the design of the machine, which follows closely several tried and proven principles. A departure, perhaps, is in the layout of the jockey bracket behind the headstock. While giving rise to no extravagant claims it is, to the best of my knowledge and belief, quite new. The theory is explained on the elevation drawing in the general view of the head in Fig. 1. Personally, I have experienced difficulty using a similar type of machine when the round leather belting (out of alignment with the jockeys while driving the largest pulley on the cone) has persistently slipped off under load. This arrangement is aimed as a cure for that complaint. It will be seen that the radial movement of the bracket enables the belt to be aligned accurately with any pulley selected and, in fact, when used in conjunction with a single pulley on the motor spindle, the action is automatic. The design of adjustable jockey mechanism, required to ensure a perfectly aligned drive through all nine speeds—assuming the motor also to be fitted with a three-step pulley—would have to be pretty elaborate, to all accounts. Certainly nothing of that kind is put forward here. There is, however, another feature which was given consideration at the time the drawings were made and that is the manner in which the present arrangement can easily be modified for direct motor drive if required.

To make the alteration, a specially cast (aluminium would do) motor plate is pivoted in place of the existing bracket. In place of the slotted quadrant arms an eccentric tensioning device is substituted and this, by movement of a lever, slackens the belt for speed changing. The motor shown in the layout in Fig. 2 is a hypothetical one, but a motor rated at 1/10 or $\frac{1}{8}$ horse power would fulfil such a duty admirably. Rotor speed should be in the region of 1,450 r.p.m. (four-pole). Suitable $\frac{1}{4}$ in. V-ropes are manufactured by Flexicon.

Further details of the eccentric tensioner are given in Fig. 3. There are four main parts: spindle, incorporating one eccentric; lever hub, the other eccentric; operating lever and two links; plus anchor bolt with, preferably, self-locking nut, and a 2-B.A. grub-screw to retain both eccentrics at the same throw. It seems to me that, having turned the spindle from stock held off centre in the four-jaw chuck, it would be a simple matter to bore out the lever hub from a piece of stock of the same diameter, obtaining an identical throw by careful manipulation of the chuck jaws.

Much as I would have liked, for my own benefit, to have constructed a machine of $\frac{3}{8}$ in. or $\frac{1}{2}$ in. capacity, the decision to restrict it to the $\frac{1}{4}$ in. was, to a certain extent, governed by the limits of my workshop. To begin with, the headstock being the largest and heaviest casting, I had to be sure that sufficient metal to pour in could be contained in one of my crucibles. The largest in use for iron is a No. 3 (under 6 lb. of iron) and, although it is quite possible fairly to estimate the weight



Photograph No. 3. Patterns for the headstock assembly

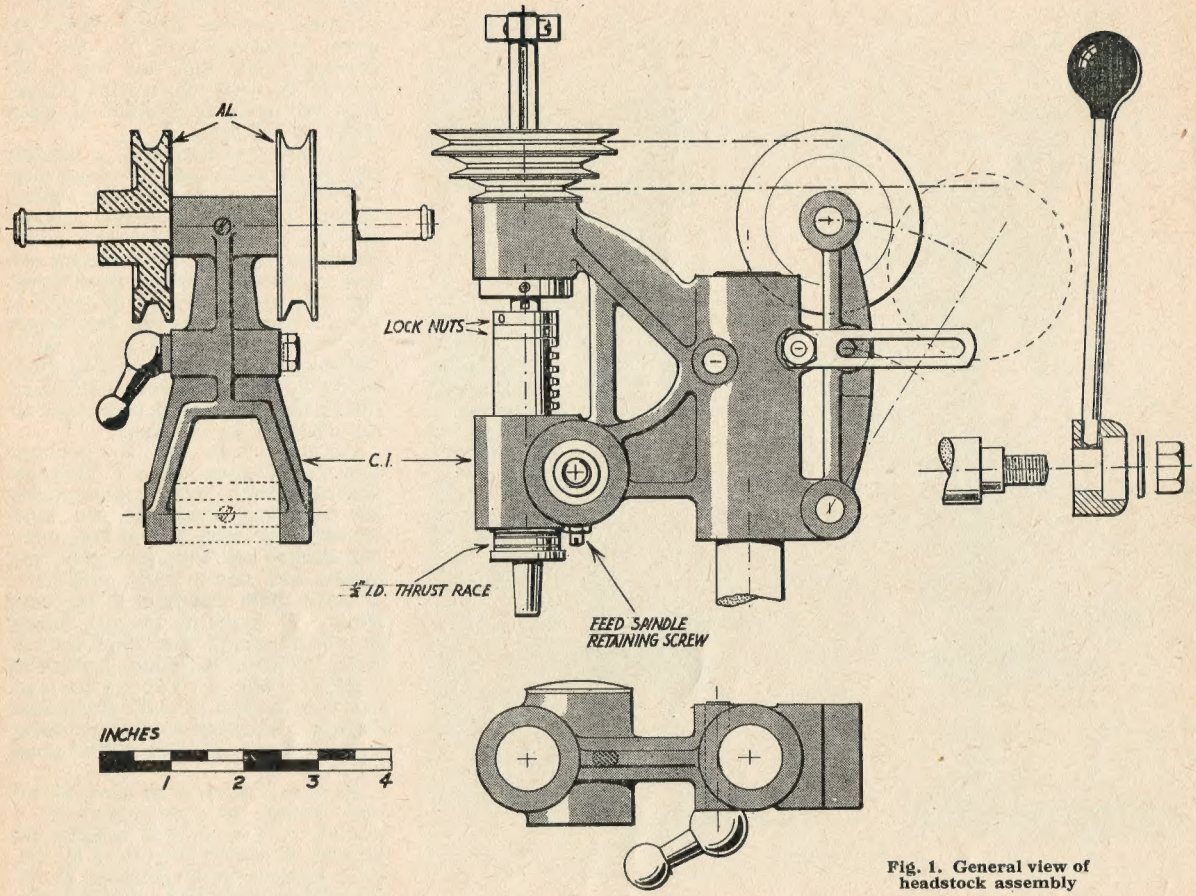


Fig. 1. General view of headstock assembly

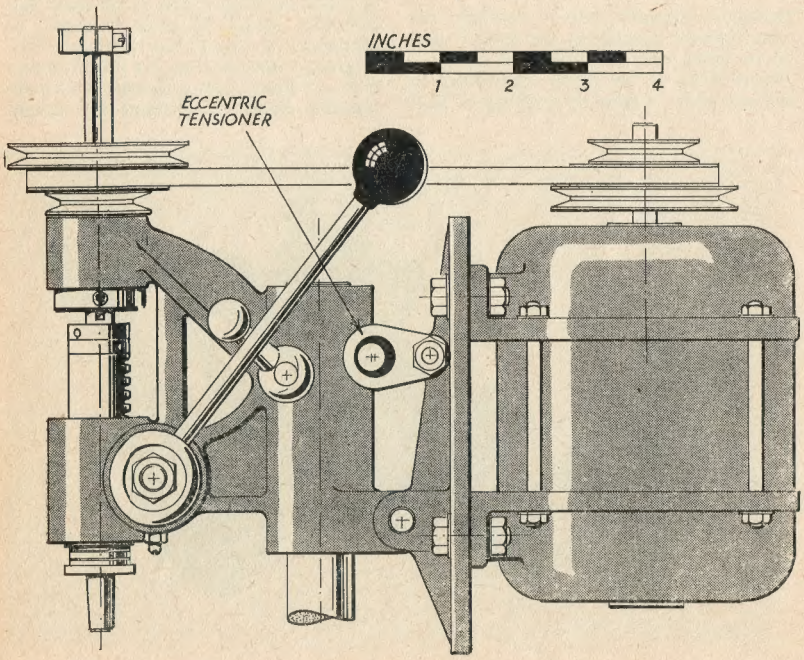


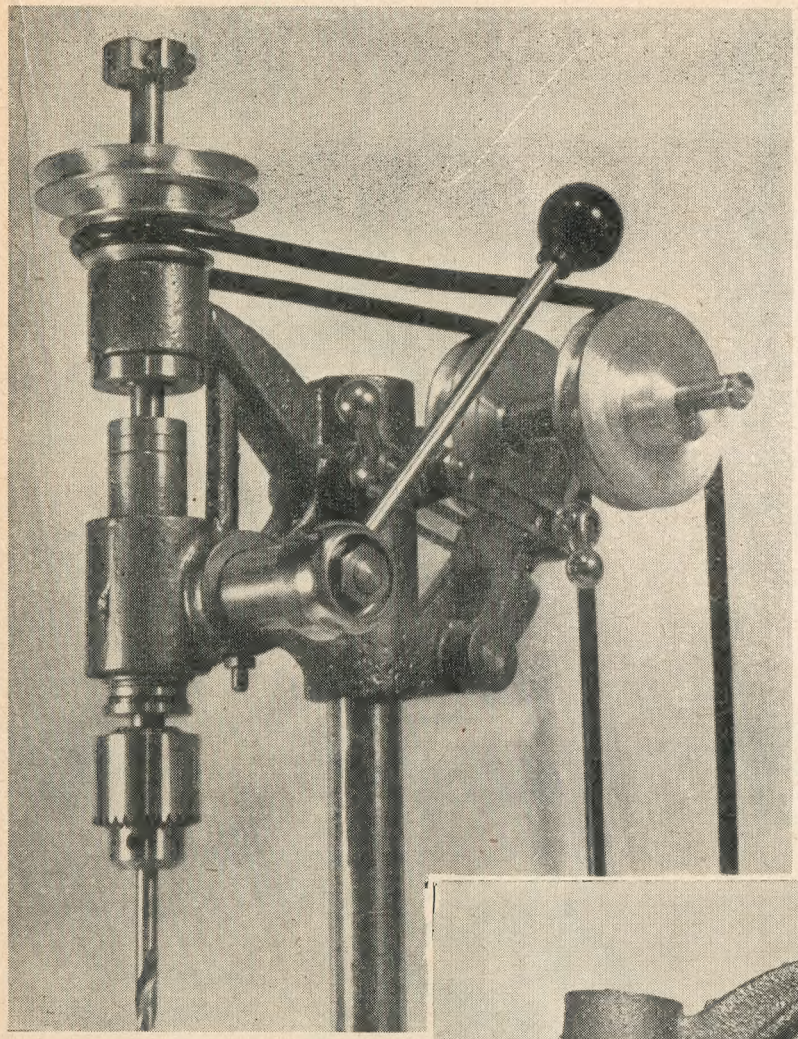
Fig. 2. Suggested modification for direct motor drive

of metal required to pour a given pattern, a further allowance has to be made for filling runners, risers, ingates, etc. To boot, if really formidable mathematical calculations are to be avoided—Aspin, my name, not Einstein! —the design must be carried out and the patterns made from it before even that kind of estimate is possible.

Thus it was that I followed the line of least resistance and made my drawings of such a size as would enable me to tackle the job with a reasonable amount of certainty. The unfettled castings turned out to be in the region of 4 lb. each, so it will be seen that I provided myself with a fair margin for error and, for future reference, a better conception of the bulk with which I am able to deal.

In the design of the head, a possible source of comment is, no doubt, the stiffening bar between the upper and lower arms. It is no accident, but an attempt to combine a light casting with adequate strength. In both castings illustrated, due to its small section it chilled; defied all efforts at fettling with a file, and thus, remains raggy.

Should any reader feel like having a crack at a similar machine and he being unhappily without the facilities for melting iron, I believe that I can safely recommend that a really first-



Photograph No. 2. The headstock complete

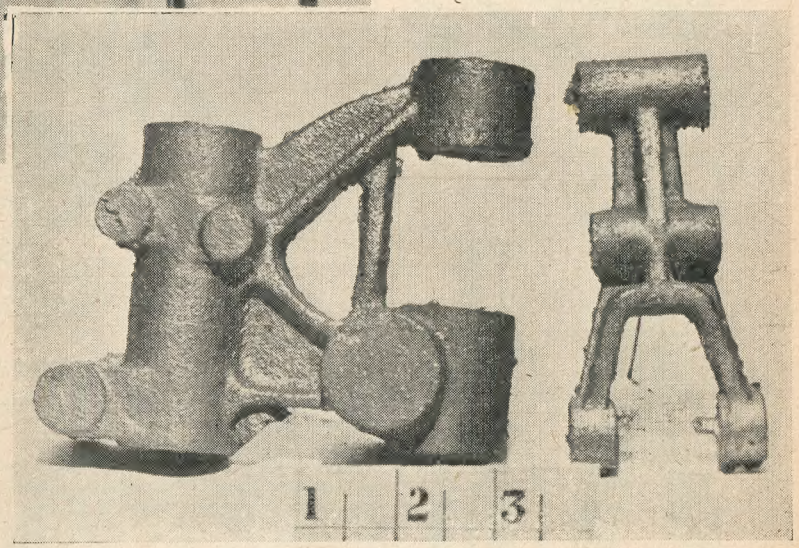
class job could be made using castings in aluminium. There should be no lack of strength.

Casting the Headstock

When the patternmaking was commenced it was intended to use $\frac{3}{4}$ in. ground, mild-steel bar for pillar and quill. Later, a decision to use bar of $\frac{7}{8}$ in. diameter instead may have meant some modification but, it was found, the section of the casting did, in fact, err on the side of robustness and was adequate to allow of boring out the extra eighth. The centres determining the mesh of the pinion to the quill, however, had been arranged with due regard to both being $\frac{3}{4}$ in. diameter, The change meant that the pinion was now limited to $\frac{5}{8}$ in. diameter. This does not amount to any actual detriment, the net result contributing to a greater arc of travel for the feed lever and, of course, a slightly more powerful feed.

To give a little variety to the proceedings, patterns were prepared and castings made for the headstock and jockey bracket before the base and drilling table components were finally drawn out. The exploded drawing in Fig. 4 will show the construction of the pattern and indicate, by the prints, that the main vertical features were to be cored out. By the way, compare this sketch, which describes a form of pattern making mainly pins and glue, with the kind of hard work required to fabricate a similar component directly in metal ! Very often, for simplicity, patterns like this are built up solid and such was, indeed, the case here. Nevertheless, it is admitted that, while complication is thus quite appreciably reduced in the patternmaking stage, the same cannot be said for the moulding stage to follow. The photograph (No. 4) of the unfettled casting shows a good deal of " flash " or roughness round the outline and the same is fully attributed to the less satisfactory process of moulding such a pattern as an oddside.

This type of pattern occurs so frequently in jobbing and " one off " practice that it is well to acquire a satisfactory technique for dealing with it. Often, when oddside moulding, the greatest difficulty is experienced in obtaining a clean " draw " from the upper box, when opening the mould for the removal of the pattern. Sometimes greater success in this direction will be achieved by inserting the rapping bar in the side which is uppermost after ramming the lower box. The cope is then added and filled without disturbing the bar which, before the mould is opened again, is rapped from the outside to loosen the pattern within. Always choose a box with longish pins in such cases. They serve as a guide to the part being lifted from the comparatively steep sides of the pattern. The drawing (Fig. 5) shows the drag part of the mould with cores positioned and indicates the location of the runner and the form of the double gating employed, to ensure



Photograph No. 4. Headstock castings with inch rule for comparison. The rough surface texture here is somewhat emphasised by strong vertical lighting

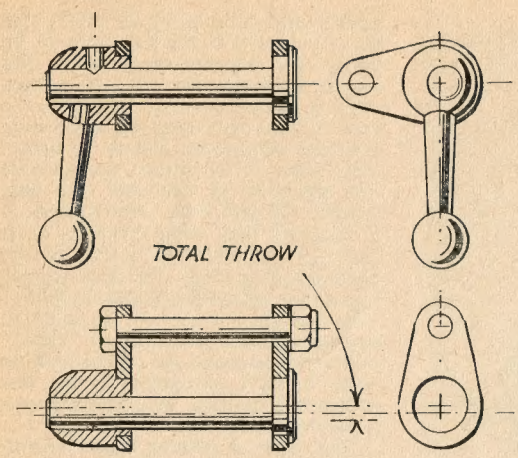
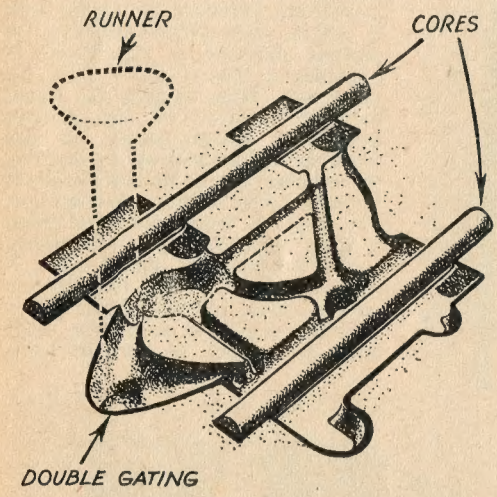


Fig. 3. Details of eccentric tensioning device



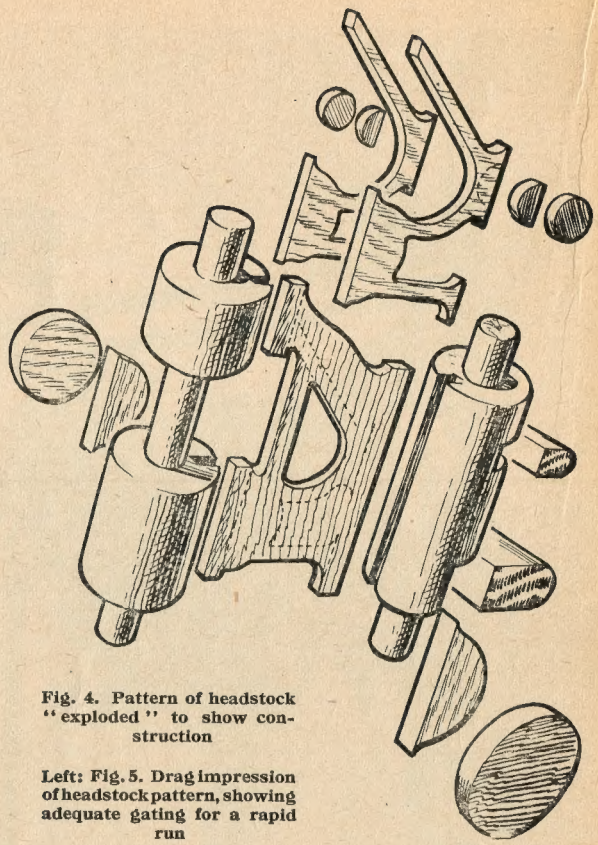


Fig. 4. Pattern of headstock "exploded" to show construction

Left: Fig. 5. Drag impression of headstock pattern, showing adequate gating for a rapid run

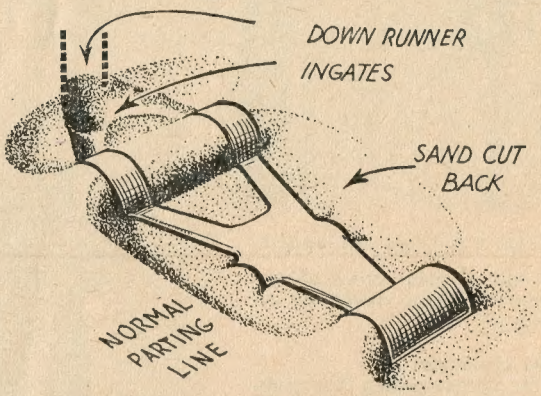


Fig. 7. Double gating again to avoid a misrun

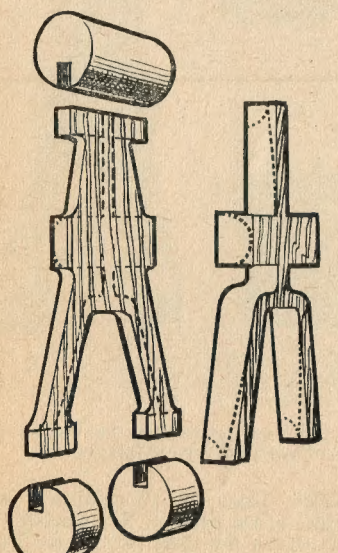


Fig. 6. Construction of pattern for jockey bracket

the simultaneous feeding of both the heavier sections. Cores were made in oil-sand reinforced with wire.

The jockey bracket presented none of these problems. The simple construction of the pattern is shown in Fig. 6, the dotted line indicating the outline to which the web was carved after sawing out the main shape. Plastic wood and cellulose filler formed the finish, as with all my patterns. It was moulded with its less-detailed side downwards; only a slight excavation being necessary to provide a clean, if irregular, joint line (Fig. 7). Funnily enough, after making a success of moulding and casting No. 1 headstock at the first attempt, requiring a lot of metal and no less care, I suppose I felt myself well out of the wood when faced only with the task of casting the bracket. Just the same, I finished up with a misrun, one-legged example through inadequate gating. Moral: Better a generous ingate to remove by sawing than no casting at all! Finally, a double gating in this case also (as shown) produced a satisfactory result. Although I used iron from choice, there was really no absolute necessity for this, as I am sure that aluminium would have proved equal to the duty in every way.

(To be continued)

Ship Modelling in Tasmania

By K. Thompson

LOOKING through my "M.E.s" for six years or so back, I cannot find a photograph or letter having originated from Tasmania, although I suppose that I am not by any means the first to write to you from here. However, I would like to send greetings to all model engineers in the Old Country from a few of the chaps down under. We watch with a little envy the progress that model engineers are making in dear old England. You see, materials, machines and castings are very hard to come by; also, they are very expensive indeed. I am one of the lucky ones. I brought my M.L.7, along with other small machines out from England with me when I migrated some six years ago; so you see, my workshop is quite the envy of my friends.

The photograph shows a model ship I have been working on for quite some time past, and hope that it will be of some interest to others who build ship models. The ship is based on a photograph of the motor ship *Norge*. It is 3 ft. 3 in. long, the hull being made of paper and shellac formed on a wooden block, with wooden bulkheads glued and pinned in afterwards. This formed a very strong job, so much so that when I was removing the hull from its former, it came off suddenly and bounced down a dozen or so concrete steps where it had been drying out in the sun. With bated breath, it was retrieved and on inspection was found, not only undamaged but unscratched. At this stage it was decided that it would be completed as a showcase model—the nearest water where one can sail a model being some fifty miles into the mountains. This, of course, is a mountain lake.

The author's workshop—the envy of his friends in Tasmania

Right: A 3 ft. 3 in. model, based on the motor ship "Norge"

The Superstructure

The construction of the superstructure was carried out in ¼-in. Perspex, with windows and doors scribed on the material with a sharp scriber. The parts representing solid walls were painted in, thus leaving the windows and doors with a definite separate appearance, as if they had been built in afterwards. In fact, if this work is done very carefully, and the scriber marks filled with gold paint, it is very difficult to detect that they are not windows with brass frames around them.

Fittings

All the deck fittings and handrail stanchions were home-made. There were some fifty parts to the anchor windlass alone. The lifeboats were carved from wood to 1/32 in. thick, with the seats, oars and fittings fitted inside afterwards. The funnel is an oil can with a block of wood beneath it to give it the correct angle. As can be seen from the photograph, it is not complete yet, but work is progressing very favourably.

The Gladiator Club

By H. Mitchell

THE Gladiator Club of Redruth owes its existence to a model engineering exhibition held in the town in September, 1952, for it was here that a fine scale model of a showman's road locomotive created much interest and revived old memories of the days when these magnificent engines could be seen, in gleaming splendour, on our West Country roads, and at fun fairs. The result of this was a resolution, made by a small number of enthusiasts, to find out what had become of these giant machines that, up to the middle 1930s, when they began to be replaced by the modern diesel tractor, were the centre and soul of the fair to so many interested admirers. Quite a lot of information was collected, which showed that a number had been scrapped, whilst others had been sold for use as portable power plants, for timber work, stone crushing, etc. Others, however, had been sold for preservation, and there were still a few scattered about the countryside which were not being

Off-side view, showing gearing, safety-valves and water-lifting equipment

Three-quarter near side view, showing flywheel, worm drive for steering gear and copper top on chimney

used, and were in danger of being scrapped, of which the famous old *Gladiator* was one. The engine was located, abandoned and overgrown, but an examination showed possibilities, and it was eventually purchased for preservation.

The history of the engine showed that it was built by Messrs. Charles Burrell & Sons in 1909, and delivered to Messrs. Anderton & Rowland when at Pontypridd. It remained in the Bristol section with the Venetian Gondolas until 1921, when the complete outfit was transferred to Capt. Arthur Rowland's Cornish section. In 1932, *Gladiator* was sold to Messrs. T. Whitelegg & Sons, and took charge of their American Radio Cars. A new canopy was fitted, and the engine was repainted about 1935, and continued in service until the second world war stopped its activity. It was then laid up at Launceston from 1941 to 1946, when it was towed to Messrs. Whitelegg's yard at Exeter, where it stood idle until July, 1953; then it was steamed over a hundred miles to Redruth.

This was no small achievement for a 44-year-old engine that had not been in steam for 12 years, and had become overgrown with weeds and bushes, and well settled in its hind quarters; indeed, it was no small achievement for the driver, who, not without incident, carried out the somewhat hazardous task of bringing the engine to its new home.

The reappearance of this monster in the streets of Redruth caused considerable excitement, and long before it reached the town it had a long stream of followers. The reason for its reappearance soon spread amongst those interested in such a venture, and there were many offers of help in all kinds of ways. Subsequently, a meeting was arranged to discuss the future of the engine; so, in order to expand the original idea, and to put it on a firmer basis, the "Gladiator Club" was formed on December 23rd, 1953. Since that date, a great deal has been done to the engine, which has regained much of its former glory. It has been on show at several carnival parades, and was once again proudly generating current at the 1954 Redruth Whitsun Fair, as it had done so many times previously.

It is thought that a few details of the engine might not be out of place here.

The *Gladiator* is a 7 n.h.p. double-crank compound showman's road locomotive, having a three-shaft double drive with three speeds, and is spring-mounted. It was built by Messrs. Charles Burrell & Sons Ltd., Engineers, Thetford, completed on December 16th, 1909, and was given the works number 3159.

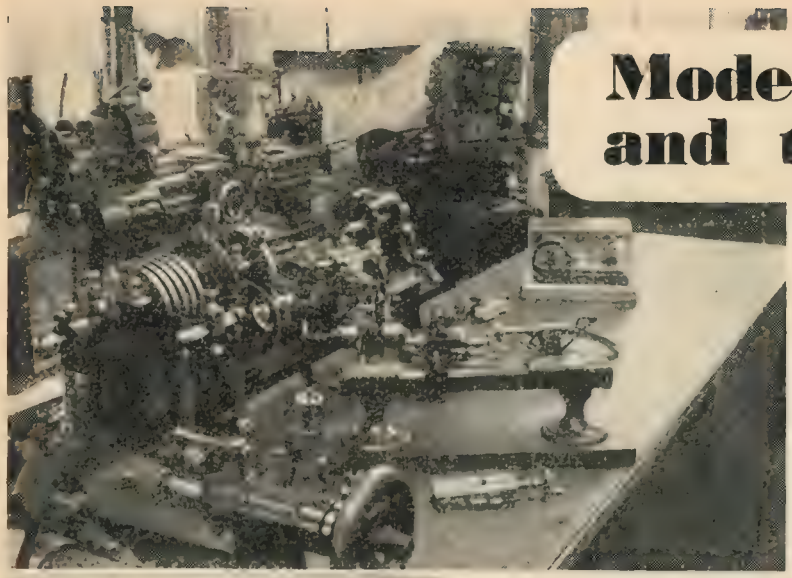
(*Continued on page 300*)

Front view, showing canopy supports and ribbing, dynamo mounting and smokebox door

Model Engineers and their Work

Mr. Stephen Clarke

By W. J. Hughes



Above: Part of the workshop; in background, Le Blond lathe and Ajax miller; centre, Heineken medal lathe of 1832 and Whitcombe Webster watchmaker's lathe with vertical-slide and special cross-slide; in foreground part of Pittler lathe

Left: Backhead and fittings for the "Princess Royal"

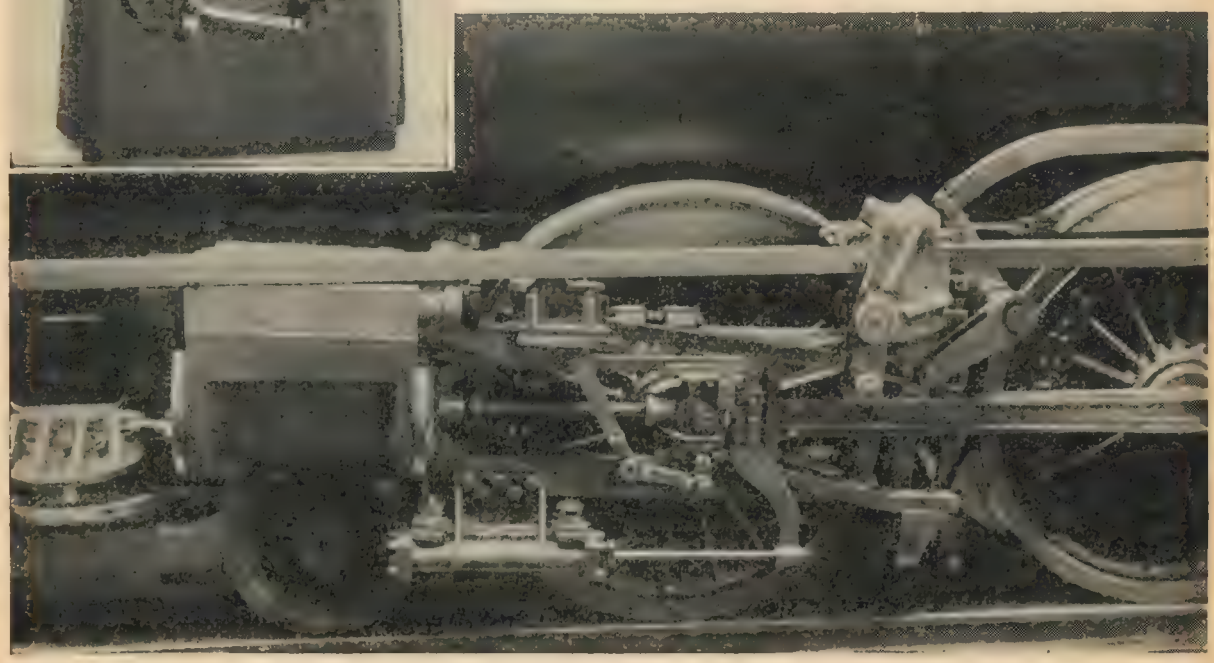
Below: Close-up of the unfinished motion-work of Mr. Clarke's ½-in. scale "Princess Royal"

THE subject of this article is not unknown to many model engineers in the South, but probably his name is best recognised in his home county of Yorkshire, where Mr. Clarke is known not only for his excellent craftsmanship, but also for his knowledge and scrupulous fairness as a judge at exhibitions.

An architect and surveyor by profession, this gentleman now lives in semi-retirement in the heart of one of Yorkshire's loveliest dales. Readers who are familiar with these valleys will know with what beauty his surroundings are filled; those who aren't may be well advised to discover for themselves the grandeur of the magnificent scenery.

Mr. Clarke's workshop contains several lathes, one being a Le Blond Regal of 5-in. centres, with all-geared head and fitted with collets. This fine American tool is used for the heavy work, but the favourite for small work is the Whitcombe Webster watchmaker's lathe. It is motorised on its own baseboard, and has a full set of collets and accessories, many of which the owner has made for himself.

Other lathes include a B.T.M. watch-



maker's lathe, a Smart and Brown 4-in. plain lathe with quick release collets, a Heineken medal lathe built in 1832, a Holtzapffel and a Pittler. In addition, there are an Ajax milling-machine with four-speed gearbox (giving thirty-six speeds in all), two hand-shapers, and a Tauco bench-drill.

The Heineken lathe is of outstanding interest, but with the editor's permission I hope to deal with this, and the Holtzapffel, too, in a further article.

Round the walls of the workshop are plenty of built-in cupboards and drawers for the storage of hand tools, which are in plentiful supply. Other built-in cupboards are used to house Mr. Clarke's collection of models, whilst down the centre of the room is a large lino-covered bench for erection purposes.

There was one point about this magnificently equipped workshop which Mr. Clarke requested me to emphasise, however, and certainly it is worth stressing. The contents have been built up over a period of many years, and the important thing is that possession of all this equipment does *not* necessarily mean either that one's output, or its quality, is increased thereby.

In fact, Mr. Clarke feels that in earlier days, when his workshop contained a bare minimum of tools, his workmanship was of a higher standard—though, personally, I could not see any evidence of decline! Be that as it may, it is a fact, which cannot be stated too often, that some of the finest models ever built have been made with tackle of a simple—occasionally even a primitive—order.

Hence the man who has to "make do," as so many model engineers have, need not despair, for his achievements are made the greater thereby. *In the event, it is the man behind the tools who counts, not the tools themselves.*

For some time now, Mr. Clarke has been building a 3½-in. gauge *Princess Royal*, and the photographs will show what a magnificent job he is making of her. The detail work is particularly fine, being as near scale size and appearance as is practicable for a working model.

Look at the close-up of the motion, with the tiny lubricators on the upper slide-bar, the same on the crosshead, the vacuum pump, and the brake-gear. And what about that backhead with its extremely realistic appearance?

The injector (not shown) is fully detailed, and so is the lubricator. The latter incorporates four single-acting pumps, driven by Scotch cranks and delivering to the cylinders and to the internal slide-bars.

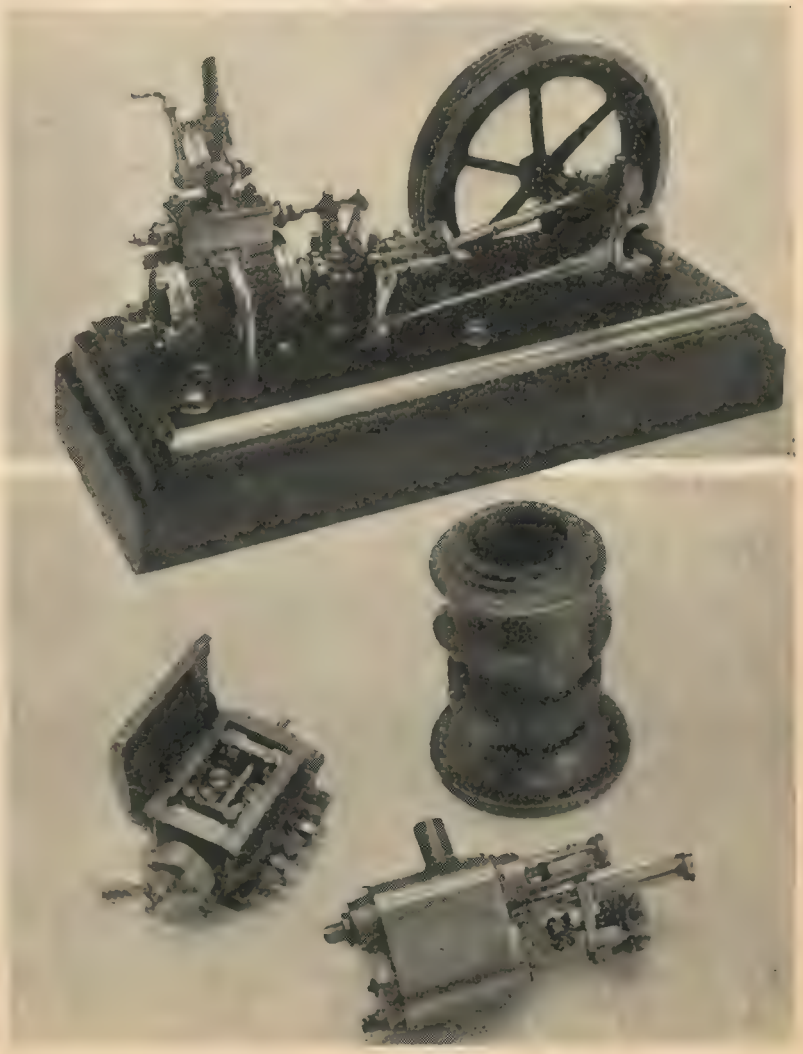
Also shown, is the chimney and petticoat, which incorporates a vacuum ejector ring. The cylinder in the foreground is from an "O" gauge steam locomotive, built some years ago with very limited equipment. As I said earlier, in Mr. Clarke's work *I* cannot find any evidence of decline.

In his report on the Brighouse

Right: The late W. G. Corner built the Babcock boiler shown in this photo

Below: The old horizontal engine which Mr. Clarke has rebuilt

Bottom of page: Lubricator and chimney unit for the "Princess," with O-gauge cylinder in foreground

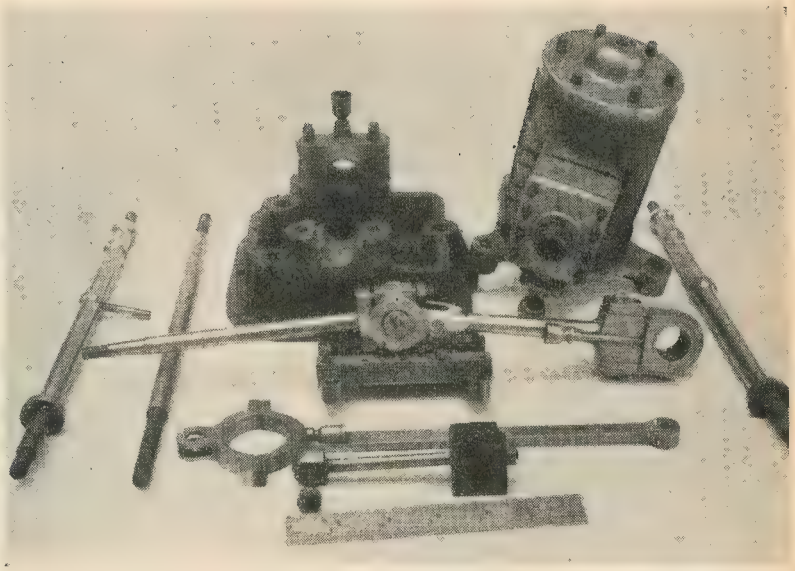


Exhibition (THE MODEL ENGINEER dated October 7th, 1954), "Northerner" described a handsome little horizontal engine which Mr. Clarke has rebuilt. This is shown in the photograph. Incidentally, the vertical engine illustrated in that article was described fully, with drawings, by Mr. Clarke himself in THE MODEL ENGINEER dated December 14th, 1953.

The components of the vertical engine shown are those of an engine, believed a "Savage," which drove the organ on a fairground roundabout. It is now being reconditioned and overhauled by Mr. Clarke. The cylinder is 2-in. bore by 3-in. stroke, and is supported on three columns, to two of which the crosshead slide is secured—one of the studs is seen. Note the strap-and-wedge big-end and the brass lubricators sweated to it and to the eccentric-rod.

Mr. Clarke also has a number of other stationary steam-engines, some built by himself, others acquired from various sources. They include several Stuarts of various sizes, and a fine beam-engine which, however, requires much time spending on it in cleaning-up and overhaul.

Finally, with one side of its casing removed to show the construction, I illustrate a Babcock boiler built by the late W. G. Corner, a former close friend of Mr. Clarke's. Many readers will remember Mr. Corner as the builder of a magnificent marine engine which won the Stevens Cup at the 1937 "Model Engineer" Exhibition.



Some of the parts of the fairground organ engine, believed to be a "Savage"

The boiler has a drum 16 in. long by 4 in. diameter, and it will be noticed is fitted with a superheater unit. It is designed for firing by primus blow-lamp, and is a most useful and efficient generator for test-running engines. The larger pressure-gauge, by the way, is not a "standard" attachment, but had been fitted by Mr. Clarke when testing the boiler.

This article by no means exhausts the interesting contents of Mr. Clarke's workshop, but space must be considered for the time being. As for me, not only shall I remember all these things, but the warm and kindly hospitality of Mr. and Mrs. Clarke will live long in my memory, too.

THE GLADIATOR CLUB

(*Continued from page* 297)

The h.p. cylinder has a bore of 6 in., and the l.p. cylinder has a bore of 10 in., each with a stroke of 12 in. Each cylinder is fitted with a slide-valve driven by separate link motion reversing gear. The flywheel is of the spoked type, having a diameter of 4 ft. 6 in., a width, at the face, of 6 in., and is fitted with an ornamental disc having a polished brass ring. A mechanical lubricator is provided, driven from the h.p. motion, and a Pickering governor is also fitted for stationary work, the drive for this being taken by a belt from the crank-shaft to a countershaft, and thence by a second short belt to the governor pulley. The action of the governor is readily adjustable for various loads and speeds by means of a wing-nut, which varies the tension of a spring attached to the valve spindle and acts against the centrifugal force of the weights. The cranks are at 90 deg., and the l.p. cylinder is fitted with an auxiliary h.p. steam valve for starting the engine when the h.p. crank is on a dead centre. The boiler has a length over tube plates of 5 ft. 7 in., and an outside diameter of 2 ft. 5⅛ in., and there are 35 fire-tubes 2 in. in diameter, giving a heating surface of 101 sq. ft. The firebox has a grate area of 6.11 sq. ft., and a heating surface of 35 sq. ft., giving a total heating surface of 136 sq. ft. The working pressure of the boiler is 200 lb. per sq. in.; twin safety-valves are fitted. Water is fed to the boiler by two live steam injectors, supplied by two front tanks, mounted on each side of the boiler, immediately in front of the driving wheels, and a rear tank situated under the footplate and coal bunker, giving a combined capacity of 290 gallons. A steam water lifter is fixed just forward of the off-side front tank, which has a bracket for carrying the flexible hose. The ashpan has a front damper only, which is controlled by a lever on the foot-plate, but it appears that the original ashpan had front and back dampers.

Boiler fittings include a steam siren, 1¼ in. organ whistle, blower, water gauge, test cocks, blowdown cock, pressure gauge, and handholes at the top of the smokebox tube plate, and on the top of the barrel, whilst at the bottom front corners of the firebox, and centrally placed at the rear, are mud-holes. A wash plug is also provided at the bottom of the smokebox tube plate.

The four road wheels are fitted with rubber tyres, the driving wheels being 6 ft. 6 in. in diameter, by 1 ft. 8 in. wide, and the leading wheels 4 ft. 1½ in. in diameter, by 9 in. wide. Brakes are fitted to the driving wheels, and to the flywheel, and are controlled by hand-wheels. A wire rope drum is fitted on the driving wheel axle, between the near side driving wheel, and the gear wheel, and when in use, two drive pins are withdrawn from the centre of the adjacent driving wheel, to prevent the rotation of the driving wheels and axle.

Built as a showman's engine, it has a full-length canopy, supported by twisted brass pillars and cross-stays, etc., motion side plates, with brass beading and ornamental rings with star centre-pieces, and also brass hub caps, boiler bands, cylinder drain cocks and pipes, tubes carrying the steam from the safety valves through the top of the canopy, and solid brass handwheels for brakes and steering.

A compound wound 110 volt d.c. generator is mounted in the usual manner on a smokebox bracket, which also has a brass front shield and pulley end cap. The chimney has a large and shapely polished copper top.

In restoring and repainting the engine, the original colour scheme of "Burrell" dark red, lined out in yellow, black and light red, was copied as truly as possible, but in places where there was originally gold leaf, yellow paint has had to suffice. The weight of the engine empty is 14 tons 4 cwt. 1 qtr.

Live Steamers in Canada

By M. G. Winslow (Manitoba)

WE should like to take this opportunity to extend our warmest greetings, to all the Brotherhood of Live Steamers, wherever they may be, and in particular to our mediator and advocate, "L.B.S.C."

As you are doubtless aware, back in 1939 we formed a division of the Live Steamers Association here in Winnipeg, and by June, 1940, we officially opened out track. Because of our geographic position, the railway was, and is, called the Red River Valley Railway. The track, which is 600 ft. long (exclusive of sidings) is built in the shape of an oval and accommodates 2½ in., 3½ in. and 5 in. gauge locomotives and trucks.

Our group, though small, is comprised of enthusiasts, each one contributing his share to the maintenance of the road. We believe that the main contributing factor to the success of our group is the clause in our bylaws which insists that an applicant for membership, when accepted, must also subscribe for a share of Red River Valley stock, as well as agreeing to pay for his monthly dues. The cost of the share, though small, accomplishes two important factors. First, it gives the individual member a feeling of personal interest in the group and track. It also tends to maintain his enthusiasm in the hobby, and he feels that he is personally responsible for any changes that might be made in the constitution and bylaws, and that his voice carries equal weight with the other member-shareholders when changes are proposed. Secondly, it provides the treasurer with a very clear picture of the club's revenue, enabling him to prepare a budget to cover a season's operation, as well as to gradually build up a reserve to cover eventual replacement of the track. In other words, the Red River Valley Railway, in a small way, operates as does its big brothers, as far as finances are concerned. Should any group be interested in this important part of its organisation, we should be glad to go into details along this line.

Through the summer months, we operate, as most live steam groups do, by having runs on weekends and holidays.

(*Continued on page* 312)

Machining Simple Worm Gears

By "Duplex"

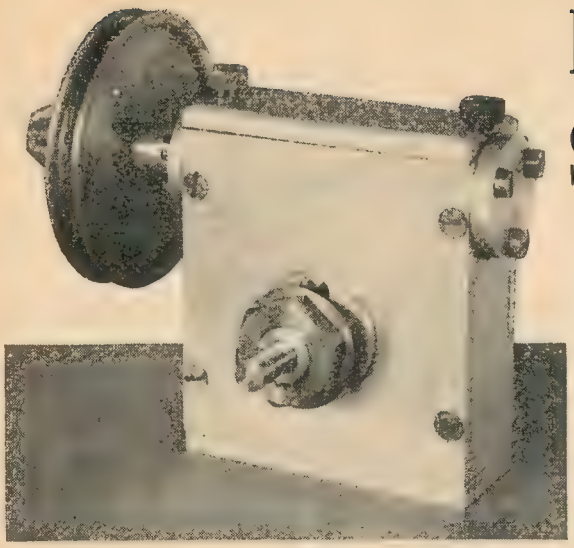


Fig. 1. A typical reduction box fitted with worm gearing

THE type of worm gearing designed, for example, for use in the back-axles of lorries and motor cars, must be very accurately made to withstand the heavy loads and shocks imposed, and yet have a working efficiency of some 90 per cent. Moreover, to generate this gearing, very elaborate and costly machinery is necessary in order to ensure products of precision grading.

However, we are not here concerned with precision gearing, and by simple gearing is meant the kind of worm gears that are suitable for many types of light drives and will give reasonable efficiency and resistance to wear.

For many years past, we have been using simple worm gearing, machined in the workshop, for actuating feed mechanisms, driving models, and for obtaining a reduction of speed from fractional horse-power electric motors. The small gearbox, illustrated in Fig. 1, provides a reduction of 80 to 1 and is fitted with a mild-steel worm gearing with a duralumin worm-wheel.

This particular unit was used for driving a gear-cutter machining attachment at an exhibition, where it ran continuously for some ten hours a day for a week, and at the end of that time no appreciable wear could be detected, nor was there any discoloration of the lubricating oil. The underlying principle of the design involves using a Whitworth-form thread for both the worm and the teeth of the worm-wheel. The worm is screwcut in the lathe, and the worm-wheel is hobbed in the same machine by means of a standard hand-tap.

No claim is made that this form of construction is theoretically correct or that the gearing will withstand heavy loading over long periods; but, as instanced above, satisfactory working under suitable conditions can certainly be expected, although it is not always possible to ensure that any exact number of teeth will be cut on the worm-wheel by adopting the machining methods described.

However, the latter consideration is of small importance where the object is solely to provide a drive with an approximate reduction ratio, as opposed to the requirements of, say, a counting mechanism.

Designing the Gearing

As the worm has to engage with a worm-wheel hobbed with a standard tap, the pitch of the worm thread must

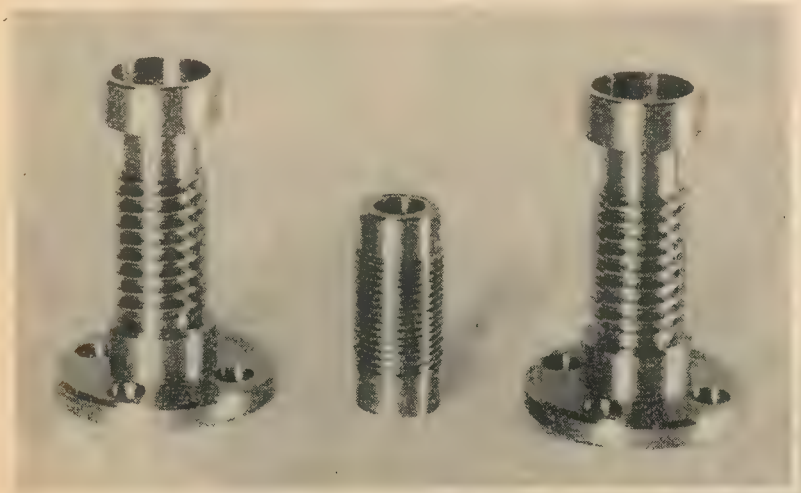


Fig. 2. Three steel worms machined in the lathe

Right: Fig. 4. The Jones and Shipman threading tool with separate form-cutters

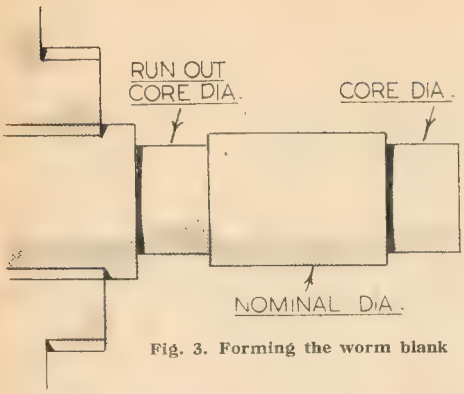


Fig. 3. Forming the worm blank

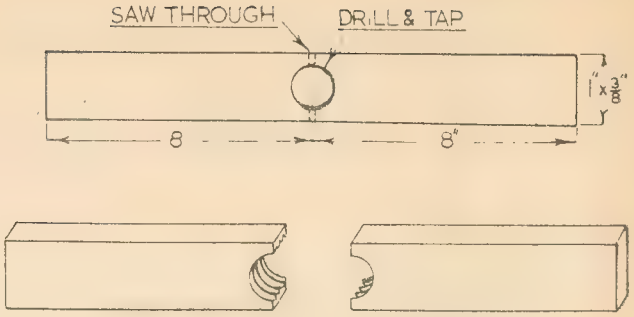


Fig. 5. Making a pair of hard-wood thread laps

be chosen accordingly. A half-inch diameter tap is a convenient size to use as a hob, and a range of thread pitches is available in the various thread standards, including standard Whitworth of 12 t.p.i., B.S.F. of 16 t.p.i., American National of 20 t.p.i., standard brass thread of 26 t.p.i., and special fine threads of 32 t.p.i. and 40 t.p.i. A worm of 26 t.p.i. has been largely used by us with good results for light drives, and for heavier drives a 12 t.p.i. worm is usually fitted.

A 40 t.p.i. worm should be used only where the loading is extremely light, as the depth of engagement amounts to barely 16-thousandths-of-an-inch.

When designing the worm gearing, the reduction ratio is first settled, and the approximate diameter of the worm-wheel can then be calculated when the thread pitch is known. Thus, if the reduction is 120 to 1 and the thread pitch 26 t.p.i., the circumference of the wheel will be approximately $\frac{120}{26}$ in., and the wheel diameter is, therefore, $\frac{120}{26} \times \frac{7}{22}$ in. = 1.47 in. approximately.

Calculating the size of the worm-wheel more exactly will be described later in greater detail, but the above will serve as a guide for determining the lay-out of the gearing within narrow limits.

Machining the Worm

In Fig. 2 are shown three finished worms, machined by an ordinary screw-cutting operation in the lathe.

To form the worm blank, the material is first centre-drilled at either end and then mounted between the lathe centres.

As shown in Fig. 3, the outer end of the blank is first machined to the core diameter of the thread, and a run-out, also of core diameter, is formed at the point where the thread finishes; meanwhile, the centre portion of the blank is turned to the nominal diameter of the thread. As the teeth of the worm-wheel will, later, be cut with a standard tap, the thread on the worm should be machined to the correct profile. For this purpose, it is, perhaps, best to use a form-tool, as this will finish the thread correctly without having to employ a hand-chaser.

The Jones and Shipman toolholder, which is provided with a separate cutter for each thread pitch, is illustrated in Fig. 4, and it will be seen that the shank of this holder has been reduced in height so that the tool can be mounted in the 4-tool turret of the Drummond lathe; but these manufacturers have also produced a toolholder of this type specially designed for use in lathes of corresponding centre height. After a cutter of the correct thread pitch has been mounted in the holder, the tool is set exactly at right-angles to the work with the aid of the familiar gauge, and the point of the cutter is set at centre height by means of the adjusting-screw with which the toolholder is furnished.

If the lathe is equipped with the extra quadrant for carrying the screwcutting gear train, as described in a previous article in this journal, it is only necessary to engage the last wheel of this train with the 65-T. wheel, normally mounted on the leadscrew, to cut the 26 t.p.i. thread.

After the thread has been machined to as smooth a finish as possible, by taking a series of light cuts, with the application of plenty of cutting oil, it should be polished by lapping, in order to reduce the rubbing friction inseparable from this type of gearing.

Lapping the Worm

Hard wood is, perhaps, the most suitable material to use for lapping the thread after screwcutting, and laps we have used for this purpose with good effect were made from a strip of teak, $\frac{3}{8}$ in. in thickness. As shown in Fig. 5, the wood is first drilled at the centre to the tapping size, and the hole is afterwards threaded with a taper tap, having a thread corresponding to that machined on the worm. If the material is now sawn across, two laps will be obtained to serve for the preliminary and the finishing operations.

(*Continued on page* 310)

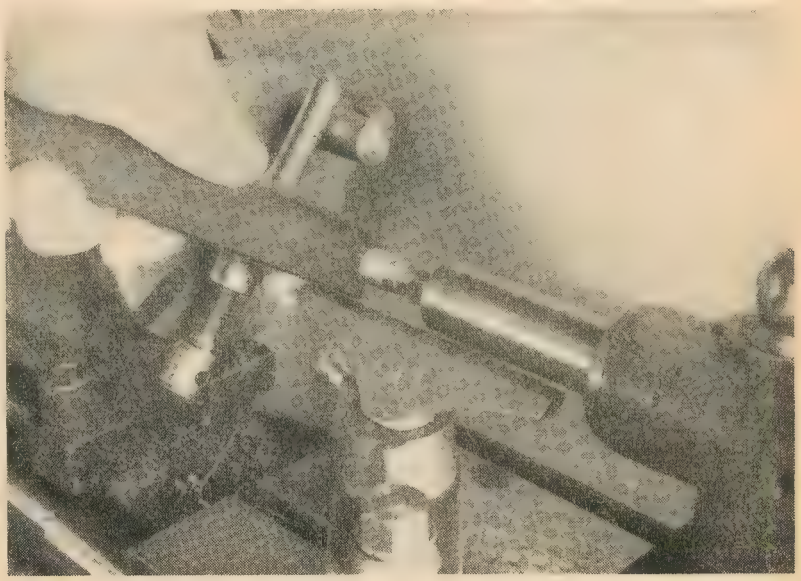


Fig. 6. Lapping the worm in the lathe

A Steam Launch with Triple Expansion Gear

By Commander L. S. Mc Cready (U.S.A.)

READERS of THE MODEL ENGINEER follow steam engineering very closely, so there need be but little in the way of an introduction to the subject of a steam launch. I had wanted to have one for five or six years, but it took quite a bit of time to bring plans to fruition.

One does not just buy the power plant for such a boat; it is first necessary to advertise in a yachting magazine. Replies bring no information on the whereabouts of the desired machinery, but rather a variety of leads. The thing to do then is to write letters and track down clues. One thing quickly leads to another, and eventually you find that there are a good number of steam enthusiasts still going, and one will have what you want.

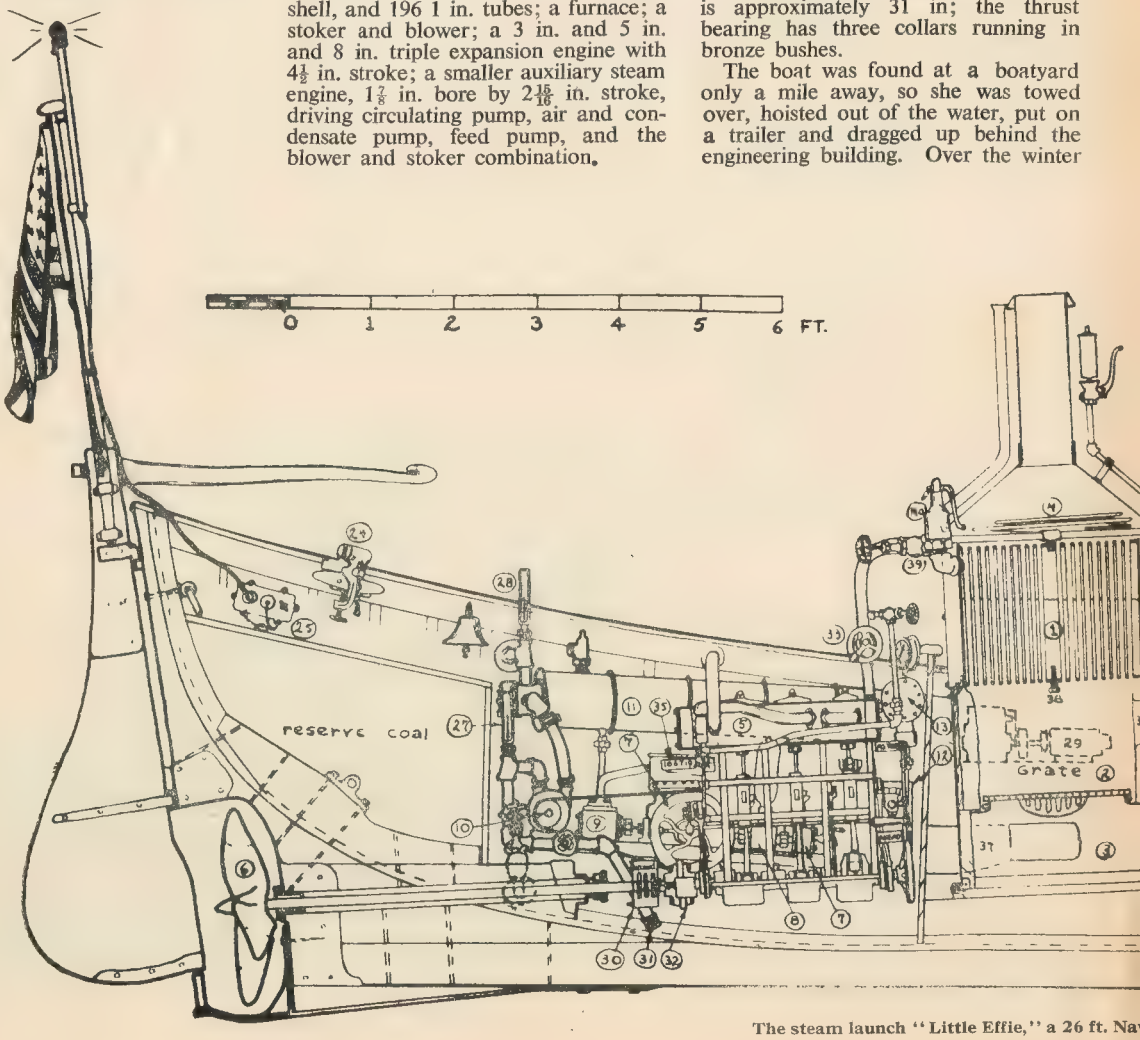
In such fashion I tracked down the power plant. I heard there was a coal-burning job way up the Hudson River, but I didn't feel I could go to what was then the asking price. As fortune had it, however, the same plant was sold to another man in Connecticut, and it turned out, that he didn't really want it after all. I did, and was mine for a specified price.

The plant, which is between 10 and 15 years old, comprises the following: A vertical fire-tube boiler carrying 250 lb. of steam, with 26 in. diameter shell, and 196 1 in. tubes; a furnace; a stoker and blower; a 3 in. and 5 in. and 8 in. triple expansion engine with $4\frac{1}{2}$ in. stroke; a smaller auxiliary steam engine, $1\frac{7}{8}$ in. bore by $2\frac{15}{16}$ in. stroke, driving circulating pump, air and condensate pump, feed pump, and the blower and stoker combination.

It was hauled home by truck and then piecemeal from home to my place of duty, the Department of Engineering at the U.S. Merchant Marine Academy. It was set up to run on the concrete outside the steam lab., and was found to run well.

Next a hull; after more searching, I found a 26 ft. ex Navy motor whaleboat, which had a diesel engine in it at one time, but when I bought it the diesel had been removed. The shaft and propeller were still there, however, and lucky it is that they were. The propeller was 18 in. diameter, but was increased to 28 in. diameter by brazing 5 in. tips to each of the three blades. The pitch is approximately 31 in; the thrust bearing has three collars running in bronze bushes.

The boat was found at a boatyard only a mile away, so she was towed over, hoisted out of the water, put on a trailer and dragged up behind the engineering building. Over the winter

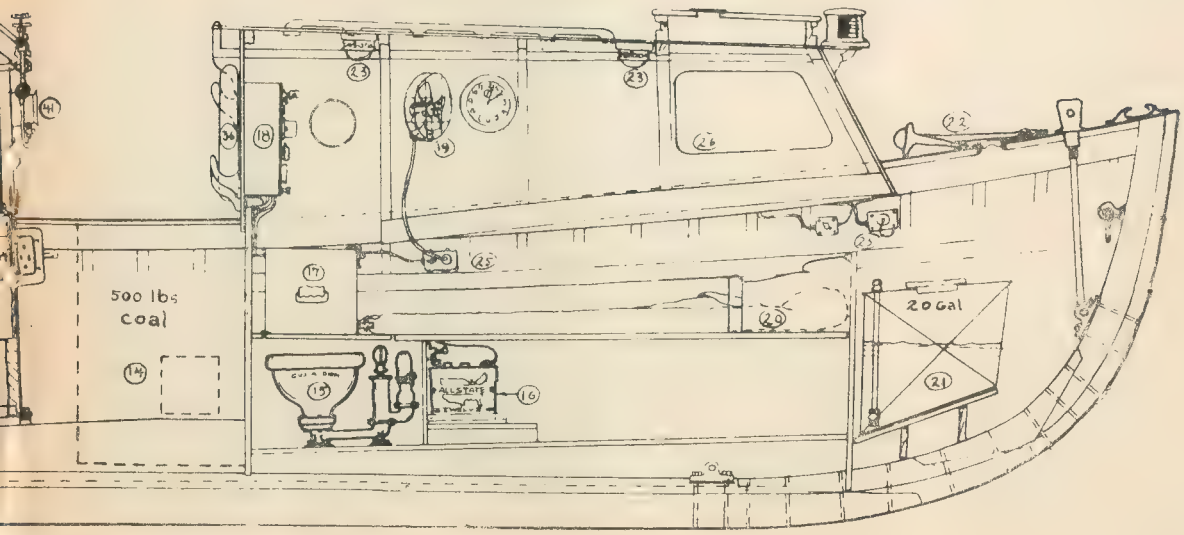


The steam launch "Little Effie," a 26 ft. Na

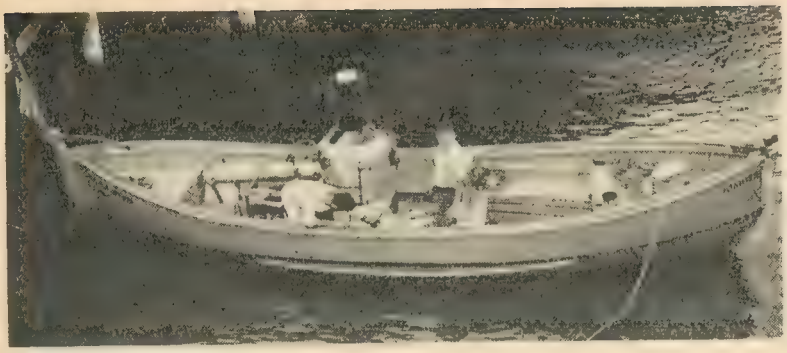
The author steering his launch while cruising in Long Island Sound

there was no work done on her, but come spring-time, we went over the boat carefully, and brought her back to proper condition. For one thing, she had been sheathed on the underbody with galvanised steel plates, but rust had set in at various places. We took them off by unscrewing a couple of thousand wood-screws. Then we had a couple of thousand holes left by the wood screws ! These we drilled with a $\frac{1}{4}$-in. drill to $\frac{1}{2}$ in. depth and plugged with dowels and waterproof glue. An electric sanding machine with heavy duty discs made short work of the plug ends and

(1) Boiler 26″ dia., 196 1″ tubes, 250 p.s.i. (2) Furnace. (3) Ashpit and windbox. (4) Economiser. (5) Engine: 3″ x 5″ x 8½″ x 4½″ triple expansion, Stephenson links, 320 r.p.m. (6) Propeller, 3-bladed, 28″ dia., 31″ pitch. (7) Auxiliary steam engine, 1⅞″ bore, 3″ stroke. (8) Feed pump. (9) Air pump. (10) Circulating pump. (11) Condenser. (12) Hotwell. (13) Feed heater. (14) Bunker. (15) Head. (16) Battery. (17) Icebox. (18) Switchboard. (19) Electric fan. (20) Bunks. (21) Fore-peak tank. (22) 35 lb. Navy anchor. (23) Cabin lights. (24) Vice. (25) Electric outlet boxes. (26) Cabin windows, ¼″ plexiglass. (27), (28) Sea injection and condenser overboard thermometers. (29) Steam dynamo set, 2 cyl., 1½″ bore, 1⅜″ stroke, 6 volts. (30) Thrust bearing. (31) Bilge injection suction. (32) Shaft coupling. (33) Throttle. (34) Firedoor. (35) Revolution counter. (36) Life ring. (37) Forced draft blower duct. (38) Fusible plug. (39) Main stop valve. (40) Safety-valve. (41) Main steam gauge.



vy motor whaleboat, converted to steam power



The launch, a moment after launching, August 4th, 1953

old paint alike. She was down to smooth bare wood in jig time, then repainted.

She has two bulkheads, making her a three compartment boat. The inside was burned and scraped and repainted in the engine room and boiler room. The "crew quarters" forward were thought less important and still remain to be finished off nicely.

The engine had to have a new engine mount which we made of welded steel and angle iron. After stretching a piano wire for alignment, we had the base put in, in good style. The little auxiliary engine rested on some special struts. The blower and stoker were discarded in favour of hand firing, but while grates were installed, we put in another blower of lighter weight. This led to the ash pit, which naturally had to be closed. It has an ash door to allow for cleaning and for steaming on natural draft.

The condenser was mounted and piped up, with vacuum gauge, makeup or "extra feed" line, main and auxiliary exhaust lines, and a relief-valve. The feed heater was installed after stripping and testing it to 300 lb. hydrostatically on the water side. The exhaust from the auxiliary engine heats the feed-water, just as on deep sea ships. The feed heater shell has a trap which discharges to the hotwell. The heater discharges to the economiser, which consists of a large coil of copper tubing in the smokebox, thence to the boiler.

A hand feed pump with small bore but long stroke was fitted. It discharges to the economiser inlet normally, but can also feed directly into the shell of the boiler.

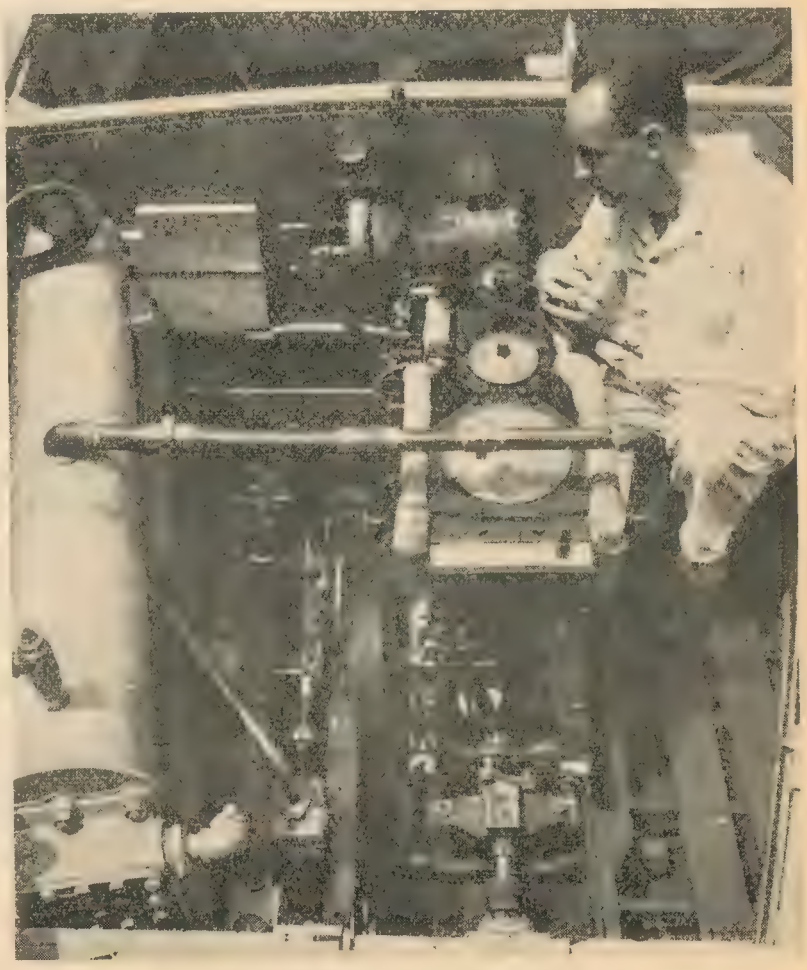
The boiler was given a few extra fittings not on when bought. It steams at 250 lb. or less, blowing off at 250. It has a water column, two try-cocks (one associate questioned whether they were now "bi-cocks"), water column drain, a bottom blow line, steam gauge, and main and auxiliary steam pipes. Naturally the boat has a whistle —two in fact. What good is a steam boat without a whistle? One is small, loud and very shrill, and the other mellow, deep voiced 4-chime job formerly an automobile exhaust whistle. This one blew fine on a few pounds of steam, but naturally choked up on say 150 lb. I put an orifice in the inlet and this restricts the steam so it blows well on higher pressures.

Many friends wondered whether the boat would carry "all that weight." The plant complete weighs about a ton, and carries maybe 500 or 600 lb. extra as coal and water. Originally the boat had a fairly heavy diesel, and was rated to carry 22 men, so I knew she would have no trouble with carrying the steam plant.

The boat was christened *Little Effie* after my mother's nick-name, the christening being done while the boat was hanging in the air from a crane waiting to be let into the water. A bottle of Coca-Cola from the Department of Engineering welfare funds' vending machine was smashed over the bow, and she was waterborne. She floated like a gull on water, very prettily.

The trial run was duly held with whistles blowing and general satisfaction. Voyage 2 brought on teething troubles. The thin galvanised steel condenser shell collapsed with a dull boom like a distant cannon shot, and we had some leaky boiler tubes, too, in one certain area.

The condenser was soon jacked out to shape again with internal water pressure and mallet blows, then stiffened



Wondering where to connect everything

with four external rings brazed on. The leaky boiler tubes were re-rolled about 40 of them. Then we sailed on short voyages for further trials. The boat is more of a work boat than a pleasure craft, but she's fun just the same. It takes two busy men to fire, oil, adjust many things, and incidentally to steer. A crew of three is better. The engine manoeuvres ahead and astern instantly, and is a pleasure to handle.

She will cruise steadily on about 125 lb. of steam and make a little over five knots. When in the bows, not a thing can be heard running, so silent is the machinery. She is hand-oiled, mostly, but two drip feed boxes oil the thrust bearing and the small auxiliary engine. It is very important to oil steam engines with steam engine oil on the bearings. Motor oil or anything that is like that simply will not do. The engine oil must emulsify with the water always dripping down and work up a creamy lather. I cut out the cylinder oil for internal lubrication, as I feared contaminating the feedwater and boiler with oil. On big tankers, we never used cylinder oil, and the wet steam did the internal lubrication very well indeed.

Linking the engine in with the Stephenson link motion very definitely makes her run more efficiently, just as in full scale practice. On around 200 lb. of steam, which I have had only for short times so far, the boat really "travels," it seems. She will do a bit over 7 knots then, and the wake foams and tumbles. I have cured the problem of the leaky tubes which originated from an internal feed line discharging too near the tube sheet. This was done by seal-welding all of them, by electric arc welding, and changing the feed line.

The whole project took something like 612 man-hours up to the launching. Nearly half the cost was for paying different men and boys to do a lot of the hull work and some of the assisting on the machine work. Lots of other good men contributed of their time. I never could have done it alone in one season, that's sure.

She is filled with hose line from the dock, water tanks topped off, kindling wood fire lighted on natural draft and in 20 min. the auxiliary engine will take the plant over, and feed it and supply forced draft. After the coal is alight, and the steam up to say 90 lb. we leave the dock and start the voyage. Plenty of wrenches, pipe fittings, assorted tools and regular engine room supplies are essential. A log book is kept. Professor John Dittrick, head of Chemistry, made me a tiny boiler-water test kit, kept in a cigar box. Regular analysis of the boiler water shows a few grains per gallon alkalinity and two or three grains per gallon of chlorinity, the same as in ocean steamships. She is, in fact, a little steamship.

It was a lot of work; but it's fun.

[Since receiving the above we have received the following communication from Commander (now Captain) McCready.—EDITOR.]

At work, installing the machinery in the launch

The boat is now undergoing general spring overhaul of hull and machinery. She is having a cabin built of ½ in. and ⅜ in. marine plywood over the forward one-third. I have built a proper coal bunker of galvanised sheet steel, riveted and screwed, with sliding door. The boiler has had a new stainless-steel jacket put on, and the engine has had the links refitted and a regular marine-type revolution counter put on, driven off the l.p. valve-gear.

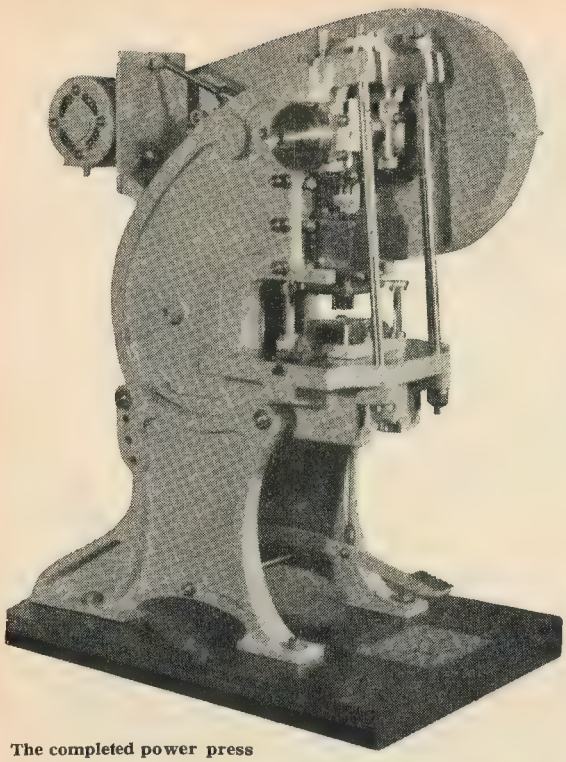
The boat will have an electric lighting plant comprising a 6-volt car battery and a Plymouth auto generator driven by a 2-cylinder steam engine. This engine I made of an old refrigeration compressor, 1½ in. bore, 1⅜ in. stroke, 2-cyl., single-acting. I put on a steam valve chest containing a D-slide valve, and a stem actuated by bell-crank from eccentric adjacent to flywheel (similar to the Stuart 2-cyl. enclosed model high speed engines), 2,300 r.p.m. on test. Interestingly, as on these machines, the pistons are driven by eccentrics instead of crankpins, and one would ordinarily not attempt to run such a device the other way round, pistons giving power to a shaft *via* large eccentrics on the shaft. However, the precision machining in the General Electric compressor coupled with splash lubrication caused the shaft assembly to spin like velvet in its smoothness either way, and I won out, over one or two scoffers who said it wouldn't run. (Possibly "M.E." readers would like to know that they can make fine little steam engines quite simply out of these one or two-cyl. refrig. compressors, just by adding a chest- and slide-valve on top.)

I am not particularly pleased over the cost. The boat cost $200 and the machinery $165, but that was of course only the beginning. $5 here, $15 there, plus labour to help at $1.50 per hour soon runs the matter way up. I confess, or state that at the present I have spent about $1,500 on the boat, all told. About half was for labour; I hired cadets (who certainly needed the money, anyway) and others to sand, scrape, repaint and so on.

Seems to me she burns about 10 lb. coal to the mile. Possibly this year she will do better than six knots, although, in truth six isn't too bad for a boat this size—six honest knots will get you there all right.

A scale model Power Press

By Raymond Berry



The completed power press

THE prototype of this model is a Taylor & Challen 10-ton, 2 in. fixed stroke, power press, running speed 100 r.p.m., and is used for piercing, blanking, and light forming of sheet metal articles. Having access to the press, and being very familiar with it, the thought occurred to me what a good subject it would be for a working model. I decided on a scale of 1/5 full size; one reason being the comparative ease of converting the dimensions, these being in my case in decimals; another reason is that this scale size would give the model a height of about 14 in. which would be convenient to handle.

The prototype is made up from three castings, two for the supporting legs, and one for the main body of the press. The latter includes the sides, bed, and slide base, and this would be rather complicated for a "one-off" casting. In fact, I doubt whether any foundry would have cast this for me, even if I could have made the pattern. So I decided to split the body into three main pieces, namely, two castings for the sides, one right hand and one left hand, and fit a separate bed, inserted between the sides. The slide base and the top arch could also be fitted separately. How this was done can be seen in Fig. 1. So during the lunch-hours I got cracking on some rough sketches, generally crawling all over the place obtaining sizes. I managed about two dozen sketches of the frames, legs and moving parts and from these a general assembly drawing was prepared. Next I made detail drawings of every separate part, and from these, I had a very good idea what the model would entail in building, and material needed.

Obviously the first thing to do was to make patterns for the castings. Now my pattern-making leaves quite a bit to be desired, but I eventually managed four pieces of wood which, to me looked alright. These were passed on to a friend of a friend who, surprisingly enough, produced four pieces of brass of the required shape and section. In fact, the moulder made a very good job of them, very clean and requiring the minimum amount of fettling. I had these made in hard brass for a number of reasons, one being that this metal was easy to have cast at the time; also, I didn't fancy steel or common iron, as this may have been a bit on the hard side for subsequent machining at home. Brass doesn't rust, anyway.

Followers of "Inspector Meticulous" may have something to say about it not being the same metal as the prototype, but surely one of the arts and pleasures of model engineering is to produce a workmanlike job with the material available.

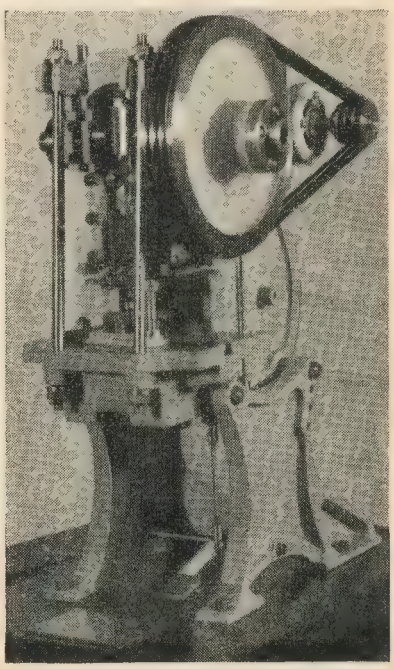
I made a start on the two castings for the supporting legs. The machining required on these was just levelling the feet and drilling and spot-facing the anchoring holes to receive the body of the press. The holes in the rear of the legs are positioned on a radius struck from the front bearing holes in the legs. This allows the body of the press to be inclined, or tipped back as it were. With the press in this position, gravity feed of the strip material can be used and the finished components fall out through the back of the press by their own weight, or with the help of an air jet.

The two side frames were next to be marked off and machined for the main bearings of the crankshaft. These were milled and bored out on the lathe, using a vertical-slide attachment. The bearing studs are $\frac{1}{8}$ in. diameter silver-steel, screwed $\frac{1}{8}$-in. Whit.

The adjusting-screw holes for the slide were then drilled and tapped $\frac{1}{8}$-in. Whit. Along the bottom of the side frame castings are a number of $\frac{3}{16}$-in. holes, counterbored for Allen cap-screws; these are for securing the press bed, which was fastened in between the two sides, as shown in Fig. 1. The bed was made from a solid piece of close-grained cast-iron, shaped to size, and bored out to suit the bed ring. This ring can be removed should a large set of tools be used to enable a large blank to be dropped.

It was then necessary to mill two tee-slots through the bed for the holding-down bolts. This was done by taking a straight cut with a $\frac{3}{16}$ in. wide milling cutter and following up with a tee-cutter. I made the tee-cutter from silver-steel, hardened and tempered it, and by taking the job quite steady, everything turned out satisfactory. This last operation was done on the old faithful M.L.7.

The slide-base, which is fitted in between the frames, is held by four 4-B.A. Allen cap-screws, and it is made



Another view of the press, with guard removed

from cast-iron. This piece forms the slide on which the ram works up and down during its working stroke. Two strips of $\frac{1}{4}$ in. ground stock are used for the nipping strips, and are bolted on the slide as shown. The slide angles are 60 deg. All that remained now was to fit the back piece and fabricate the arch over the main bearings; the body was then more or less finished.

On the arch, two lugs can be seen; these were silver-soldered on, and are used when the tie-bars are fitted to the press. These are used when maximum effort is needed. Next to be tackled was the machining of the moving parts, crankshaft, big-end, ram, flywheel, etc. These can be seen in Fig. 2. The crankshaft was machined from a piece of $\frac{7}{8}$ in. diameter silver-steel, having a throw of 0.400 in., with all journals $\frac{7}{16}$ in. diameter. A $\frac{1}{8}$ in. wide slot is milled in the flywheel end to receive the clutch key.

The big-end was milled out of a piece of $\frac{5}{8}$ in. diameter silver-steel, fitted with a split bearing in the normal way. The ram, made from steel, is machined all over and provision is made, as shown in Fig. 2, for an adjusting-screw. With this the position of the tool-box can be altered to suit the press tools being used.

Operations were suspended for a time until a piece of material was obtained for the flywheel. This needed to be 5 in. diameter for scale size, and up to now the scrap box revealed nothing at all. However, as no doubt happens to many model engineers, relations and friends come to the rescue, and an offcut just about the right size was presented to me.

This lump took quite a while to machine to size, but eventually it was accomplished. On the periphery three vee grooves are turned for the belt drive from the motor. Two tool-steel bushes, one with three 0.125 in. × 0.100 in. keyways equi-spaced around the bore cut in it, and one plain bush, were shrunk in the bore of the flywheel for the working of the clutch. This method of inserting bushes saved the job of cutting a long keyway in the flywheel itself.

Perhaps a few words on the operation of this clutch would not be amiss. I remember that when I first had dealings with a power press, this type of clutch seemed a bit of a mystery.

Suppose the motor is switched on ready for operation, then this allows the flywheel to run freely on the crankshaft. If the pedal is pressed right down and released again, the crankshaft

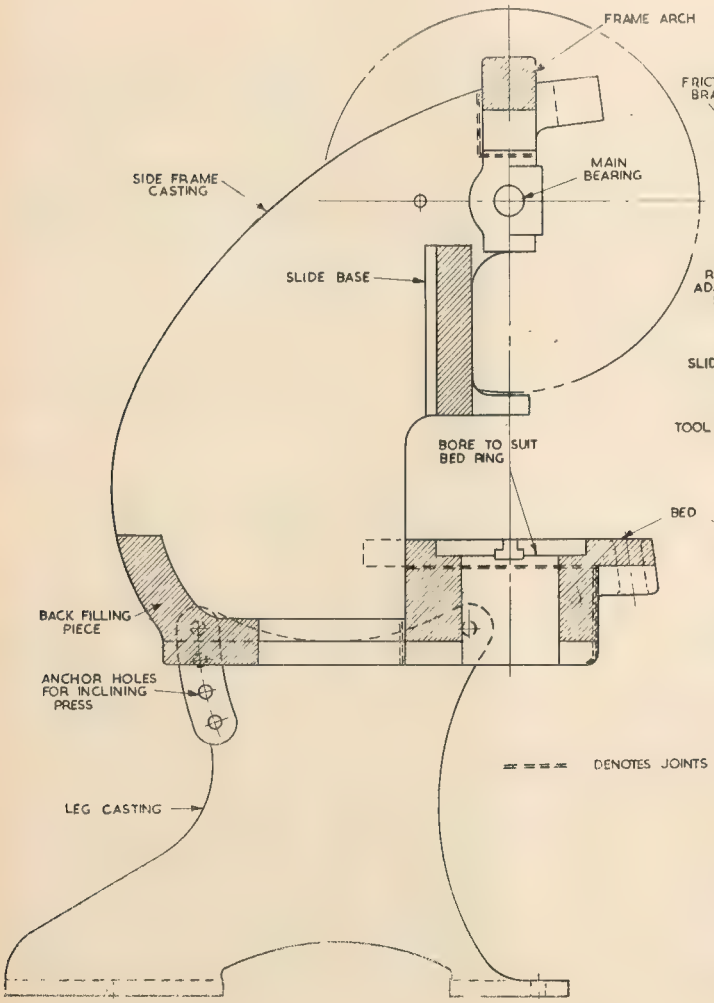


Fig. 1. Cross-section of press frame, showing method of construction. Shaded portions indicate separate pieces

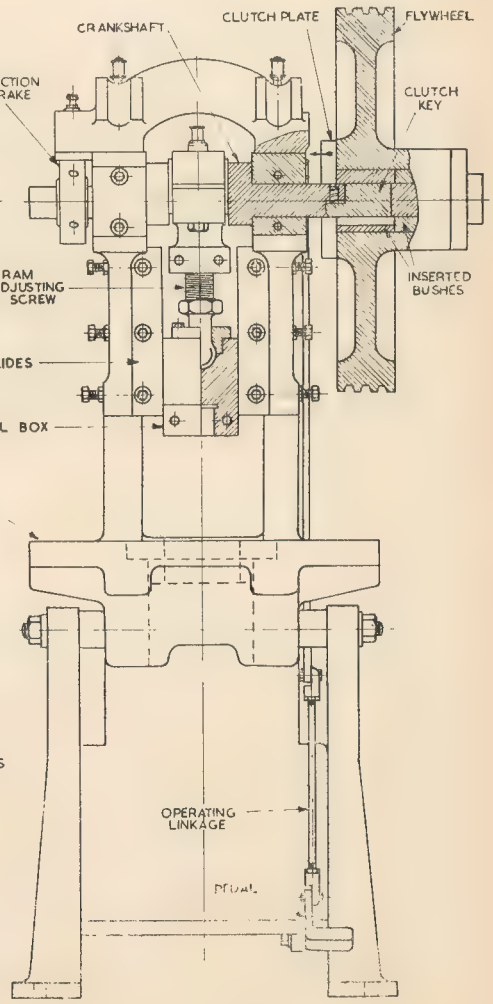


Fig. 2. Front elevation, part section, showing clutch mechanism

turns one complete revolution, starting and finishing at the top of the stroke. If, however, the pedal is pressed down and held there, the crankshaft will continue to revolve until the pedal is released, and will stop once again at the top of the stroke.

Riding loosely on the crankshaft, pressing close to the face of the flywheel, is a clutch plate, Fig. 2, which is operated through a lever system by the foot pedal. Through the centre of the crankshaft a 0.125 in. wide slot is milled to receive a spring-loaded tool steel key, Fig. 2, which is held inside the crankshaft journal by the clutch plate when the press is at rest. Assuming the pedal is pressed down, the clutch plate is pulled back along the crankshaft in the direction of the arrow and the key is allowed to protrude and fall into the nearest keyway in the revolving flywheel. As long as the pedal is depressed, the flywheel will continue to turn the crankshaft.

When the pedal is released, the clutch-plate is allowed to gradually slide back to its former position by the action of a compression spring on the clutch-rod. The clutch plate can now override the key which protrudes from the face of the flywheel and, owing to the cam profile which is machined in the bore of the clutch plate, gradually forces the key back into the crankshaft, thus breaking the drive from flywheel to crank journal.

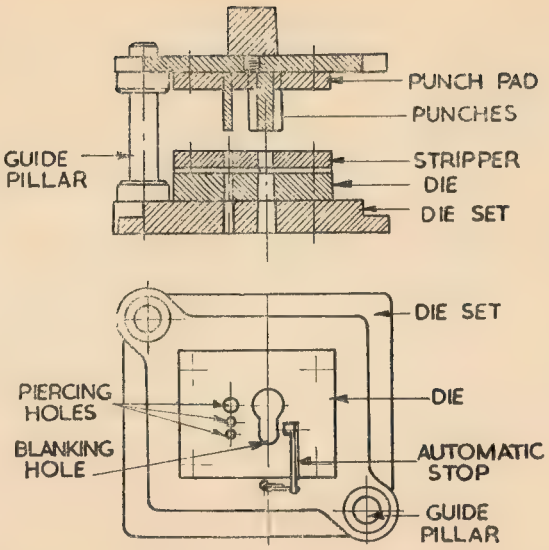
On the other end of the crankshaft, a friction brake is fitted to slow-up and stop the crank on the top of its stroke when the key disappears into its slot. On this type of press, this brake is composed of a hard wood block pressing on to a machined boss which is keyed on to the crankshaft. Varying pressure can be put on this block by a set-pin in the top of the casting.

The motor shown in the photograph is, I'm afraid, a dummy, made up from assorted bits of aluminium, and mounted on an adjuster plate to tension the driving belts.

A dummy motor was fitted, for the simple reason I couldn't obtain an electric motor small enough and strong enough to drive the model. Maybe some reader could enlighten me on this matter. The motor would have to be about 2 in. diameter and 2½ in. long, to give about 500 r.p.m. with quite considerable torque. At the moment I can belt-drive the model, using a pulley wheel held in the lathe chuck which in turn is driven by a 1/3 h.p. motor.

I could not resist making a small set of tools for use in the press, and these are an exact replica of a full-size set of follow-on tools used in the press work trade. The die, Figs. 3 and 4, is 1¼ in. long × 1 in. wide, made from ¼ in. thick ground stock, hardened and ground; the punches are made from silver-steel.

The complete tool does two operations, namely, piercing three holes and blanking the component from the strip, the component in this case representing a 6 B.A. soldering-tag made from 0.006-in. copper strip, Fig. 5.



Above: Fig. 5. A soldering tag, actually stamped out on the miniature press

Left: Figs. 3 and 4. Cross-section and plan of the tools used for blanking and piercing the component shown in Fig. 5. Plan view shows the die and base

On the tools an automatic finger stop is fitted to locate the strip as it passes through the tools. This is operated by a striking pin on the moving punch-pad, and is allowed to lift up and drop into the hole in the strip formed by the blanking punch. When in operation, the operator presses the pedal and keeps the strip moving up to the stop on the completion of every stroke.

With this type of tool, a complete component is blanked with every stroke of the press; so, as this press is rated at 100 strokes per minute, allowing for loading and clearing time, quite a few thousand pieces can be produced in a working day.

A sheet metal guard is fitted around the belt drive, totally enclosing the flywheel and motor pulley. The guard is joined through the centre and the top half can be removed by taking out two pins, one at each end.

The model is enamelled in pearl grey, and was completed in about one year's spare time.

I wish to thank Messrs. B. & W. Penning for the photographs, and others who have helped in obtaining material and " gen " for this model.

MACHINING SIMPLE WORM GEARS

(*Continued from page* 303)

With the work still mounted between centres, the lathe hand-rest is secured to the cross-slide, so as to nearly touch the worm, and the height of the rest is adjusted to enable the lap, when held horizontally, to be engaged with the work.

After the lap has been charged with carborundum grinding paste of, say, 120 grit size, the lathe is started, to run at a medium speed, and the lap is pressed firmly and squarely against the work and allowed to travel along the thread. When the tool marks have been obliterated in this way, the second lap, charged with fine grinding compound, is used in a similar manner, and the lapping is continued until the threads have a smooth, polished surface. The worm can now be parted off ready for boring. As it is essential that the bore should be truly concentric with the threaded surface, the worm is carefully centred in the four-jaw chuck by applying the anvil of the test indicator to the plain portion of the work which was previously machined to the core diameter. The bore is next drilled from the tailstock, 1/32 in. or so undersize, and a small boring tool is then used to machine the bore to the finished dimensions.

Although some workers may prefer to finish the bore with a reamer, unless great care is taken it is only too easy to form the bore bell-mouthed. However, there should be no difficulty in machining the bore accurately if a fine finishing cut is taken with a properly sharpened tool and it is allowed to cut only on the forward traverse. Where possible, the worm is best made solid with its shaft, but when it is a separate unit it can be secured to the shaft by means of two Allen or plain grub-screws, spaced at 90 deg. apart.

In a further article, machining the corresponding worm-wheel will be described.

READERS' LETTERS

Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents.

THE MURRAY LOCOMOTIVE

DEAR SIR,—In the article by L. C. Sherrell on page 103 of your January 27th issue, it is suggested that Murray designed as well as built the 2-1-2 locomotive. The design, however, is that patented in 1811 by John Blenkinsop a coal viewer of Middleton, Yorks. He specified, incidentally, a wooden or cast-iron frame, and a wrought-iron furnace flue.

Partington, in his history of the steam engine, quotes the following details said to have been given by Blenkinsop to Sir John Sinclair:—

It had two 8-in. cylinders and weighed 5 tons. It drew 27 wagons, weighing 94 tons, at 3½ m.p.h. on a dead level, and 15 tons up an incline of 2 in. in the yard. It had a speed of 10 m.p.h. when lightly loaded. It cost £400, and did the work of 16 horses in 12 hours.

Several were built and employed in hauling coals from Middleton to Leeds.

Yours faithfully,

London, N.6. JAMES ROWATT, Sqn.-Ldr.

BENT-CRANK GAS ENGINES

DEAR SIR,—With reference to Mr. J. Brice's letter on bent-crank gas engines, I would like to say that from about 1890 to 1900 it was standard practice for Messrs. Tangyes Ltd., Cornwall Works, Smethwick, Staffs, to fit bent cranks of the type referred to by Mr. Brice, on all but the very largest gas engines of their make. These were referred to as nominal engines, being rated on their nominal horse power. In 1900 a new range of engines, were designed, having crankshafts machined from the solid, and the horse power ratings were b.h.p.

You may recall that a Tangye gas engine of the 1890 period with bent crank was shown at the "Model Engineer" Exhibition in 1951 by the writer and Mr. F. H. Tapper. The engine is now on view to the public in the Birmingham Science Museum.

Yours faithfully,

Smethwick. A. J. KENT.

BLAST PIPES AND COAL

DEAR SIR,—I notice that "L.B.S.C." mentions having seen a drawing of a permanent jimmy, in the form of a cast cross, on the blast nozzle of a pre-war Chapelon engine. I should not like to say he is wrong, but I have never come across this particular form, though what they call barrettes are very usual, these being four cast projections on the inside of the nozzle top, somewhere about an inch square in plan and fared off on the under edges. The object of these projections is not to sharpen the blast, but to divide the jet so that the area in contact with the smokebox gases is increased.

Personally, I am not at all sure that an awful lot is known about the working of the blast pipe and chimney, as several quite different arrangements seem to work equally well. Swindon currently is getting some marvellous results from a plain single nozzle with a large portion of the jet in contact with the smokebox gases, this following the theory that the smokebox is evacuated by means of the smoke gases getting entangled with the steam ; thus, the larger the surface in contact the better the action.

On the other hand, the Kylchap arrangement has to its credit examples that are even more efficient than those of Swindon, that is by the ratio of back pressure to vacuum created, and this design, as with other French ones, does not seem to follow the same theory. Certainly the jet is broken up so that its surface is increased, but it is then led through petticoat pipes so that its contact with the smokebox gases is very small indeed. The Kylchap design has two pipes between the nozzle and the chimney, and these are all so close together that little surface is left for the gases to intermingle.

As illustrating this unpredictability of results, I well remember the five Caledonian "Dunalastair 2" class locomotives purchased by the Belgian State Railways round the turn of the century, the native Belgian express design at the time being a very clumsy looking 2-4-2 inside cylinder machine with double frames and a prominent wide firebox of 52 sq. ft. grate area, huge chimneys and a fluffy exhaust designedly to deal with the slack and briquettes that was usual in Belgium. Yet these Caledonian engines with only 20½ sq. ft. grates and deep boxes took over the job with complete competence and were put on the best trains. Many more were subsequently made in Belgium. I happened to be living in Belgium at that time and naturally saw a lot of these machines, largely at the Ostend Quay station where they were used on the international trains. Whatever may be said about briquettes not being used in France nowadays, they were certainly used in Belgium then, almost entirely, and the Caledonian engines obviously thrived on them. I do not think any alteration had been made to them except that they had right-hand drive and the combined lever-and-screw reverser which was standard on the B.S.R.

In those days, there were no silly passports and one could wander with complete freedom between the steamer and the trains, and everyday many people used to meet the arrival of the afternoon steamer and see the trains leave for the distant parts of Europe. Nowadays, one's passport has to be stamped every time one enters or leaves the quayside ! Ostend is now, alas, just one more place from where the steam locomotive has departed for good!

Yours faithfully,

Bexhill-on-Sea. C. M. KEILLER.

FINE ADJUSTMENT OF 3-JAW CHUCKS

DEAR SIR,—Most contributors on this subject refer to "tapping" the chuck body. I have never been quite satisfied with this method, but it was not until the advent of the Burnerd "Griptru" chuck that a simple solution occurred to me.

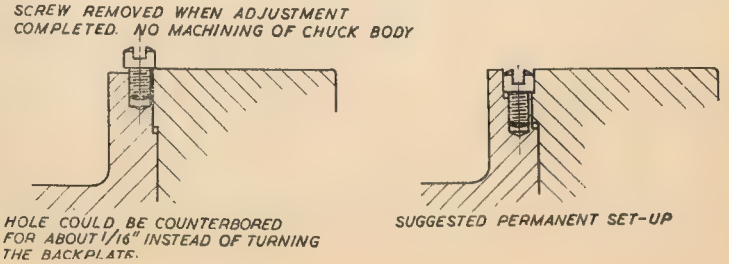
I turned the backplate to a slightly smaller diameter than the chuck and drilled and tapped four holes at 90 deg. in it close enough to the chuck to enable the head of a socket screw to effect the adjustment. When adjustment is required, I insert a short socket screw into the appropriate hole, but a neater idea would be to sink four screws below the surface.

Yours faithfully,

Auckland, N.Z. T. ROUNTHWAITE.

RUST IN WORKSHOP

DEAR SIR,—For this hardy annual or, we might say, perennial, Shell "Ensis" oil is an excellent specific.



I keep a wide-necked half-pint bottle of this handy. It has a bung in the top with a camel hair brush pushed through centre so it is just a matter of seconds to give anything a coat.

Little-used tools or equipment such as a milling spindle, angle-plate, etc., can be given a coat after use and will have absolute protection until required again. Also parts of machine tools which are not normally handled can be given a coat and, of course, anything that has been made can be so treated. I use it on brass parts as well, as it prevents tarnishing.

One must not overlook the rusting that is caused by perspiration. This is particularly bad in the case of some workers' skin. "Ensis" copes with this but an application of "Rosalex" dry, before commencing work is a good safeguard.

Yours faithfully,
"CIRCA 1888."

RUST PREVENTION

DEAR SIR,—I have read with interest recent articles by your contributors on the subject of rust prevention in outdoor workshops—a matter which has troubled me for many years.

An idea has now occurred to me for an entirely new approach to this problem, which, if successful, would have obvious advantages.

Briefly, this consists of an arrangement for providing a continuous supply of dry air into the workshop from an outside source, thus tending to expel moisture which would otherwise creep in during damp weather.

I had thought of running an underground air duct consisting of a 3-in. drain pipe ending at a point behind the domestic gas cooker in the kitchen, where there is a Sentry boiler always in action. A small electric fan installed in the workshop would be arranged to draw air through the duct and discharge into the workshop.

I should be interested to hear whether any of your readers has attempted a remedy on these lines, and with what success.

Yours faithfully,
Streatham. A. B. S. TATE.

DRAWINGS WANTED

DEAR SIR,—In connection with the information supplied through your most valuable publication, THE MODEL ENGINEER, I am wondering if there is a possibility of acquiring drawings which I have been completely unable to obtain in this country (South Africa).

I have completed a model of a muzzle-loading field gun to vague details copied from an old oil painting The barrel was turned from a piece of old brass propeller shaft and the wheels and trail fabricated from wild olive wood. This wood is best obtained from the ex-German South Western desert, but is very hard to work. High speed tool-bits require repeated sharpening, but the result is worth the trouble. This gun was entered in a local Hobbies show and was greatly admired. A further exhibition is scheduled to take place in about six months time and I intend entering two exhibits which are still to be made. These are as follows:

(1) Model of naval field gun with limber, such as was used at the display given at Earls Court during the Coronation celebrations (a time of wonderful and happy memories).

(2) Model of a diver's helmet and breastplate as manufactured by Messrs. Siebe Gorman.

I have made extensive enquiries in an endeavour to obtain the necessary details and sizes, but without success. Back numbers of THE MODEL ENGINEER have been delved into with the same result. I might add that this latter method is very interesting, as such a fund of interesting reading is to be found in these volumes that the original object of the search is liable to be forgotten. This is especially so when those chatty articles by our very good friend "L.B.S.C." are discovered.

I shall be pleased if anyone could advise me as to the existence of any such drawings or could suggest a possible source of supply.

Yours faithfully,
Cape Town, S.A. J. P. NEWTON.

THE KITCHEN MIXER

DEAR SIR,—With reference to the article on this subject in the February 17th issue, a much simpler method of driving the agitators is to place the motor horizontally in the top piece, with the single-start worm driving between the two gears on the agitators. This gives suitable reduction and synchronisation, and also saves three gears and bearings.

An endplate, with ball, at opposite end of motor to take end thrust will also save waste of power.

Yours faithfully,
Bradford. A. LAMBERT.

WORM GEARS

DEAR SIR,—With reference to the article entitled "A Gear-cutting Device" in your issue for February 3rd, the included angle between the flanks of the cutter sections at the bottom right-hand side of Fig. 6, should be 37½ deg.

Yours faithfully,
Acton. H. WINTON.

LIVE STEAMERS IN CANADA

(*Continued from page* 301)

During the winter, we hold monthly meetings at respective members' homes. At these meetings members' projects are inspected, advice and suggestions are made to individual builders, and the group formulates plans for the coming season.

The highlight of our year comes during the September Labour Day weekend. This is the time set for our annual "meet." The past few years the "meet" has become international in its scope, as we play host to visitors from Chicago, Minneapolis and St. Paul, as well as enthusiasts from Fort William, Ontario. These visitors have to travel, round trip, over one thousand miles to participate, and we are proud that our fraternity comprises individuals who can meet on a common ground, whose interests are our interests and that we all share a love for "live steam." So successful have our international meets been that the thought has occurred that should the membership of the United Nations be composed of "live steamers," how harmoniously would problems be solved when all concerned, despite barriers of language, would have a united feeling of goodwill towards one another, due to one common love of the "brotherhood"!

To show that we are red-hot enthusiasts, I am sending pictures of a run we had on New Year's Day. The temperature was seven above zero and a strong wind was blowing at the time. Naturally, we do not suggest that we make a habit of track meets in the winter, but we did want to find out how successfully miniature locomotives would operate in cold weather.

The heading picture shows our genial president, Jack Kerr (in engineer's overalls) firing up his ¾-in. scale Hudson, whilst the chief boiler inspector, Jim Hewitson (in overcoat), looks on. Roy Swain is helping by connecting up the hose bags. The second picture shows the Hudson on the "line" with steam up and "pops" blowing; while picture three shows Bert Swain preparing to climb aboard the flat car for a run.

Needless to say, operations did not continue too long, as we all became quite cold. Even the bearings on the flat car froze up. However, it was an interesting experiment for those of us who turned out.

In closing, we should like to extend a hearty welcome to any of the readers to pay us a visit should they happen to be in our vicinity; and to all of the "brotherhood," both near and far, may we sincerely wish that in their respective activities or group projects "all their lights be green."

[*The word "enthusiasts" appears to take on a special significance in the conditions described by Mr. Winslow, and so clearly portrayed in the photographs. "Seven above zero" amounts to 23 deg. of frost!—Editor.*]

QUERIES AND REPLIES

"THE M.E." FREE ADVICE SERVICE. Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:
(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked "Query" and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

Interference from Switch

I have a lathe in my indoor workshop driven by a 1/3 h.p. a.c. motor of the split-phase type, incorporating an automatic switch operated centrifugally when the motor runs up to speed. It is controlled by a push-button starter incorporating thermal cut-out. Some trouble has been encountered with this installation in respect of TV interference. This does not occur when the motor is running normally, but only when switching on and off or when the automatic switch in the motor operates. I may add that the thermal cut-out of the starting switch often operates when the lathe is in the middle of a job. Can you please give me any advice on this matter?

A.J.W. (Birmingham 32).

The most effective way of suppressing interference caused in this way is by fitting a suppressor unit to the main supply leading to the workshop. If you have a double-pole switch or junction box inside the workshop fairly close to the motor, that would be the best place to fit the suppressor.

Messrs. A. F. Bulgin Ltd., Alfred's Way, Barking, Essex, can supply a suitable suppressor unit if you describe the purpose for which it is required.

Incidentally, you mention that the thermal overload sometimes operates in the middle of a job. This should not be so if the cut-out is properly adjusted, and the motor is not overloaded. The fact that it operates suggests that something is not correct in this respect.

Suction Fans

I wish to obtain a suction fan which will produce approximately twice the suction created by a domestic vacuum cleaner. I have a ¼ h.p. motor running at 1,425 r.p.m. which I propose to use to drive the fan. Can you give me any advice on a suitable design of fan?

L.V.R.K. (Chippenham).

The term "twice the suction created by a vacuum cleaner" is rather vague. We presume that you mean twice the difference of pressure between the suction side of the fan and atmosphere, and would advise you that this is extremely difficult to get with any type of rotary fan.

With a motor running at only 1,425 r.p.m., the difficulty would be still further increased, as most suction cleaners work at much higher speeds of rotation, with multi-stage fans. If you require a high degree of suction, we suggest that some form of displacement pump, such as the vane type of pump, which is obtainable on the surplus market, would be more suitable.

Metric Taps and Dies

Can you please advise me of any source of supply of International Metric fine-thread taps and dies, 8 mm. diameter by 1 mm. pitch? I have tried several tool dealers in this locality and they inform me that these cannot be obtained.

J.H. (Liverpool 7).

Taps and dies to the International Metric fine-thread standard are manufactured by most British manufacturers, and we suggest that you might be able to obtain them from one of the following firms:—

Lehmann Archer Ltd., Hampshire Works, Forest Road, Fairlop, Nr. Ilford, Essex.

British Tap & Die Co., Triangle Works, Town Road, London, N.9.

Overheating of Motor

I have a ½ h.p. capacitor-start induction motor which has begun to overheat and cut-out on the thermal overheads, even when running light. Is this an indication that the motor needs rewinding, as everything else is in order?

S.E. (Chapel-en-le-Frith).

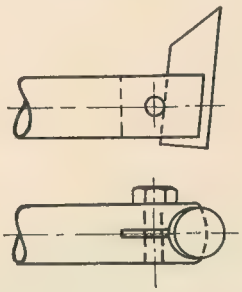
You do not say whether your motor reaches its top speed; if it does, and rapid heating occurs, then there is some fault in the running winding. If, on the other hand, it seems sluggish in reaching full speed, the fault will probably be in the starting winding. You can satisfy yourself on this point by disconnecting the starting winding, switching the current on, and then spinning the rotor shaft. If the running winding is in order, the motor will run up to speed in whichever direction you start it; you will then be able to determine where the excessive heat is coming from, and in any case, it is probably a case of a rewind.

Wood Turning Tools

I am proposing to turn between centres a number of tapered oak legs in the M.L.7 lathe, with an off-set centre at the tailstock, and using the self-acting feed. If possible I should like to use one tool to remove the unwanted wood as quickly as possible and give a good finish with the final fine cut. What are the best tool angles for this kind of work, and are there any tools specially made for wood turning by means of the slide rest in this way?

A.T.O. (Purley).

It is possible to get quite good results by using a round-nosed tool similar to that employed in metal work, but with a very considerable top rake, up to 45 deg. or even more. We have used a tool



made from a short piece of round silver-steel about ⅜ in. diameter, clamped in a holder so that the axis of the tool is presented at approximately 10 deg. to the vertical line, and with the top edge ground off at an angle of 45 deg.

Tools somewhat similar to this have been in commercial production, including one particular type which used a semi-circular tool, somewhat similar to a wood turner's gouge.

Next Week . . .

"NETTA"
Instructions on how to erect the boilers and make suitable burners for the two smallest engines in this series will be given.

POWERED CROSS-SLIDES
The description of the application of power for operating lathe cross-slides will be concluded.

GURNEY-TYPE BOILER
Boilers of the "Gurney" type are not very often modelled, but this issue will contain an illustrated description of an interesting coal-fired example.

PETROL ENGINE TOPICS
E. T. WESTBURY will continue the description of his latest design, the 10-c.c. 4-stroke engine which has already aroused much interest.

A SENSITIVE DRILL
The second instalment of the article dealing with the construction of a useful drilling machine for the home workshop.

A BEAM ENGINE EVOLUTION
The interesting story of how a model beam engine grew out of practically nothing, with the result that it seems to be right to within "a couple of eighths."

L.B.S.C.'s Lobby Chat

A DATE WITH MILLY AMP

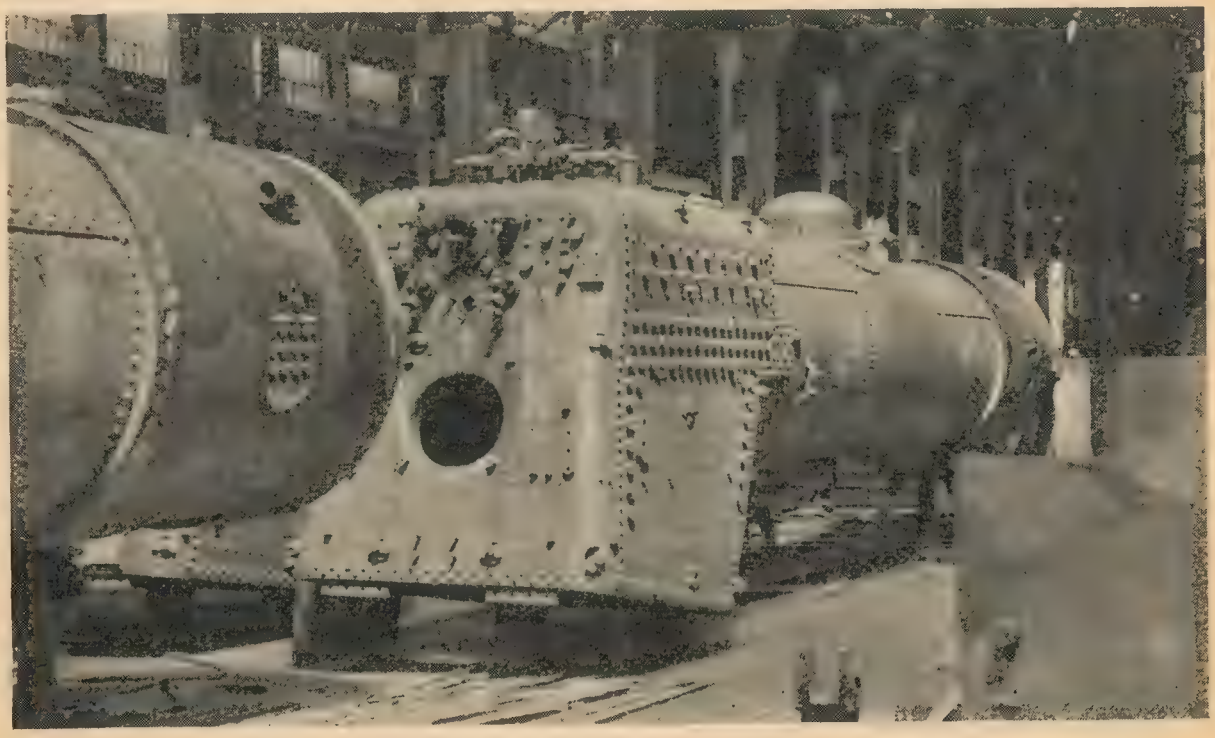
SOME time ago, our good friend "Cadet" described, in jocular vein, how his workshop was wired up for lights and power by a tea-consuming professional director of sparks and shocks, and how he received a shock of another kind when the account came in. I passed a few friendly comments at the time, and suggested that it would have been cheaper, and more satisfactory, if our worthy friend had done the job himself, saying that it was easy enough when you knew how, and adding that I had done all my own wiring, inside and outside, even to the electrically-operated automatic signalling on my little railway. Arising out of this, I have received requests to give a series of instructions on workshop wiring, motor installation, and what-have-you; but I haven't done so, for the simple reason that I just don't reckon to poach on other folk's preserves.

However, it may amuse regular followers of these notes, and maybe afford assistance to the correspondents mentioned above, if I tell the story of a recent date that I made with Milly Amp, and how I "modernised" (that is the fashionable word nowadays !) the wiring and connections in the "locomotive works." Incidentally, Milly and myself are the best of friends; personally, I should be lost without her help in my locomotive-building, and I give her full credit for the manner in which she runs the London Underground, and the Southern Electric, with an efficiency which Old King Coal could never hope to attain, though she is glad of his helping hand when the live rail is iced up ! Even Milly can't beat Dame Nature.

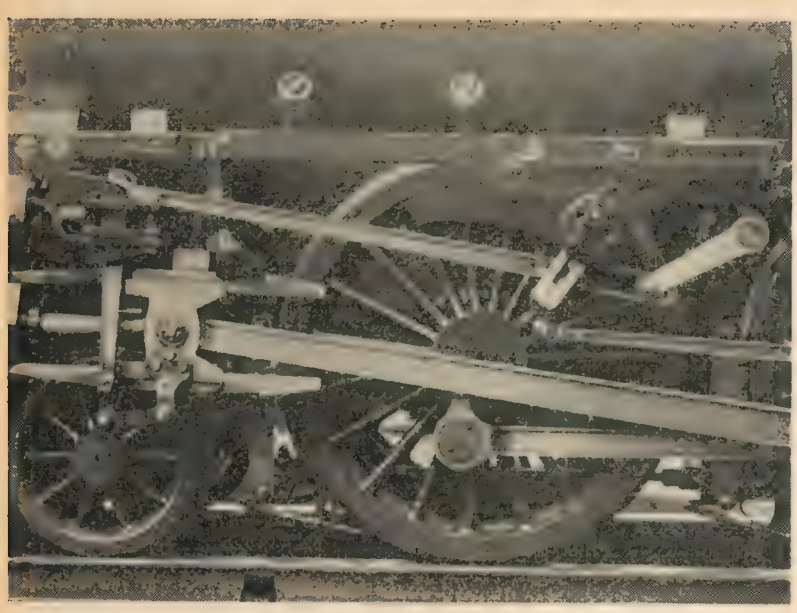
When we first took possession of this hacienda, then newly built, in the fall of 1930, the line pressure of the "juice" in this district was 205 volts, supplied by a private company. My first two motors were of G.E.C. make (one ½ h.p. and one ¼ h.p.) wound for 200/220 volt and I used 210 volt lamps. In the room which I decided to use for a workshop, there was an ordinary two-pin power plug in the skirting-board, fed by a 15-amp. twin lead-covered cable. I soon pulled that merchant out of it, and installed a 25-amp. ironclad double-pole switch, with fuses complete, alongside the door, about 2 ft. off the floor, bringing the cable up through a fresh hole in the floor, and connecting it to the supply side. Above this I fitted a four-way distribution box, from which cables went to the motor switches, and to the drop lights over the two lathes (Milnes and Boley) and the pillar drill. The light in the middle of the ceiling was, of course, already wired to the usual house-lighting circuit, and controlled by a switch just inside the door, let into the wall.

Extensions Soon Needed !

It wasn't long before I began to acquire more machines, and of course that meant another bench to carry them, and motors to drive them, with addi-



Firebox staying on a full-size locomotive boiler



Valve gear of Tom Arnott's Super-Doris

tional lighting. I preferred separate motors, to avoid fitting up lengths of shafting and pulleys; and rinnin' a big motor tae drill a wee hole, is muckle wastefu' o' juice, ye ken. I needn't waste space here, by describing how the workshop grew to its present proportions; suffice it to say that there are three half-horse and five quarter-horse motors, eight drop lights and two 5 ft. fluorescent tubes installed. In due course I acquired the piece of ground out back, alongside the full-sized railway, and first erected my garage. A juice line was run out to this, controlled by a d-p switch with fuses, via a ½-in. galvanised iron pipe in the ground. A battery-charger was installed, two overhead lights, a wandering lead, and a spare power plug for a motor-driven compressor for tyre-pumping, which I hadn't then, but have now; pumping by hand is hard work for an old body like me. I also fixed a wall lamp for "shunting" in darkness.

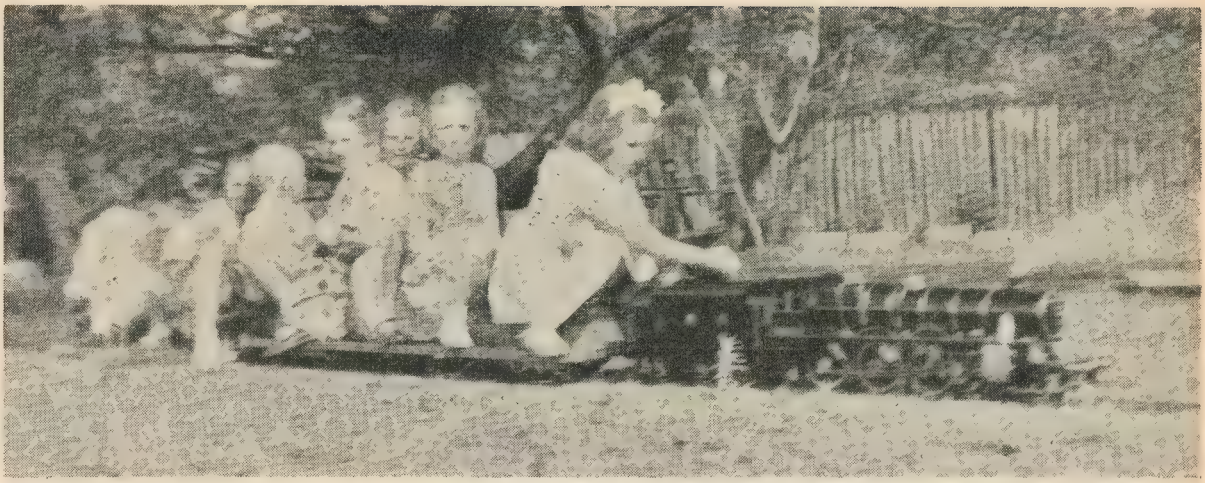
Then came the railway; and for night running, I acquired two discarded street gas lamps, and converted them for electric lighting; they were erected for me by the full-size permanent-way gang who levelled the ground, and set out and planted the concrete posts which carry the railway. I also installed a plug for my electric steam-raising blower. When I fitted the automatic signalling, there was all the track-circuit wiring to do, and another plug to put in, for the motor which pumps air to operate the old Brighton signal. The last additions to the outfit were two garden sheds, in one of which I keep the railway accessories. Both these were wired up for electric lighting from the mains. The signal circuits are fed by a 12 volt car battery, which is kept up by the garage charger.

"Red-hot Hairpins"

Everything went like marriage bells for years, but eventually came a spot of bother. Due to the expansion of house-building in the surrounding district, more and more current was called for, and neither the local sub-station, nor the feeders could cope with the demand for "juice." As soon as daylight faded, and lights, fires, and cookers came into operation, down went the voltage. The lamps looked as though they had red-hot hairpins inside, the flu'-tubes flickered and sometimes went out altogether, and the motors lost all their kick. The G.E.C. supplied me with a voltmeter, which I connected up permanently, via a tumbler switch, to my feed line, so that I could check up on the pressure at any time; and in mid-evening, this often fell to 160 volts or thereabouts. Complaints rolled in thick and fast to the now nationalised suppliers; and at long last, something was done about it. The juice merchants started laying in a new main feeder, with a local "sub," and secondary feeders for the streets; we received notices stating that the supply would shortly be changed to the 240 volt standard pressure, and representatives would be calling, to see what would need doing to adapt consumers' apparatus to the new pressure.

The representatives duly arrived; and when they checked up on my outfit, they nearly fainted! According to the statutory regulations, suppliers, when changing voltage, must make any change or replacement, to consumers' lamps and appliances, without charge, and at the least possible inconvenience; so they took all particulars, and departed. Then I did a big think. They had informed me that a local firm did all motor rewiring, etc., and somehow I didn't like the idea of pulling out all my motors, and letting Tom, Dick, Harry & Co. operate on them. I therefore decided to ask the district manager to supply me with a step-down transformer for the motors, which I would fit myself, and relieve the Board of all responsi-

A neat job of "Plumbing"



"She is only an Engineer's Daughter—But she knows how to entertain friends!"

bility for that part of the business. I told him that quite a small one would suffice, as I never had more than two motors working at once. Back came a very nice letter from the D.M. thanking me for my suggestion and offer, saying that it would save the Board both trouble and expense, and he would send his representative with a sample transformer, to see if same would suit my requirements. Then it was my turn very nearly to faint, for the gadget he brought was a 5-kilowatt auto-transformer, of sufficient capacity to run every darn thing in the shop at once, and then have a bit left over! It is hardly necessary to add that I accepted it with alacrity.

The New Layout

All was now plain sailing. I decided to rewire the whole kaboosh, splitting the wiring into two separate circuits; one direct from the main, feeding all the lights, and the Metrovick motor on the Myford lathe, which is 235/250 volt, also a Black & Decker grinder, which has a motor of same capacity. The second line would feed through the transformer to all the other motors, and to the line going up the garden to the plugs on the railway, for the signal pump and steam-raising blower. I thought that I'd do the job properly, whilst at it, so ordered a 50-yard reel of twin lead-covered cable from the G.E.C. along with six three-pin switch-plug outlets, a dozen connectors, some flex, and other oddments. I had in stock, a 30-amp ironclad double-pole switch, and an ironclad five-way distribution box, given to me some years ago, so I was all set.

Down came the old wiring, and the distribution box. The 30-amp. switch was fixed on the wall, directly under the other one first mentioned, and the two connected in parallel. The ironclad distribution box was fixed on the wall in the same place as the original wooden one, and new lengths of lead-covered cable run from this, to the various motors, and to a secondary box, from which ran the feeder up to the railway. From this box also, there is a line leading down to a light in the ex air-raid shelter, now a coke shed; and another, to a bracket on the wall outside my workshop door, carrying a lamp over the tank which holds brazing pickle. These two lights are therefore still on the lower voltage, as it wasn't worth while putting in a separate 240 volt line for them.

The original distribution box was refixed in a new position, close to the 30-amp main switch. From the first point in this a lead-covered cable serves as main feeder to the lights, connectors being inserted to accommodate the flexes for the drop lights. The second point feeds the Myford and grinder motors direct, which are higher voltage than the others, as mentioned above. The third connects, via a new cable, to the line running out to the garage, the charger being suitable for 240 volt and needing no adjustment. This line runs through the "Crystal Palace," the nickname given to the glass lean-to outside the kitchen door, and a three-pin plug is inserted into it, to feed the G.E.C. washing-machine. A fourth line is now being put in, to feed the rotary ironing attachment for the washer, as this has a heating shoe, which takes 1,200 watts, which would overload the existing line, with the motor working, and any lights on.

The wiring alterations being completed before the date of the change of voltage, I put in a temporary connection between the original main switch and the ironclad distribution box, to feed it direct from the main. The transformer was a mighty heavy box of tricks, so I put it on the end of the bench just behind the Myford lathe, where it needed no fixing, and was well out of the way. The wires were connected to it all ready; and when "der Tag" arrived, all I had to do, was to remove my temporary connection between main switch and distribution box, and connect the transformer wires to both, which job only took a few minutes. All the lamps in house and garage were then changed, and flu'-tubes and radio sets adjusted; and when the 240 volt current was switched on at dusk, Bob was our uncle. Since then, there has been no voltage drop, and I can still pick up 12-B.A. screws off the floor without the help of a torch.

I also did the needful to the domestic laundry iron, and the fridge, but they are nothing to do with locomotive-building workshops, so needn't dilate on those jobs. I also snatched the opportunity to install a new three-pin switch-controlled outlet on the skirting-board in the front room, for our Singer 306; which, incidentally, is a vastly different proposition to the old Wilcox & Gibbs treadle-operated stitch-and-miss, which I was taught to operate in childhood days. The dressmaker said that the second name should have been spelt with a J, but it went all right for me. I'm glad that this journal doesn't run a woman's page, or our worthy managing editor might be after me for contributions! Anyway, all that the juice-purveyors had to do, to set us right for the new voltage, was to rewind the motors in the vacuum-cleaner and hair dryer, and put new elements in the small portable fires; rather less than the "Bill-Massive" kind of job that they anticipated when they first called to "inspect the works." Public officials nowadays, are often inclined to be—well, "snooty," shall we say? Not so our district manager, for he sent me a very nice letter, courteously thanking me for my co-operation and help in the

changeover; a gesture which I greatly appreciated.

My principal reason for recounting the above, is just to show that anybody with the average amount of "gumption," need not "pay through the nose," nor spend nearly as much as the bill on providing cups of tea, for such a simple job as wiring up a home workshop for lights and power. No skill is required to scrape insulation off cable-ends, insert the bared wire into sockets in plugs, switches, or connectors, and tighten screws. Modern bakelite fittings don't even need mounting-blocks to attach them to walls; and no insulated cleats, conduit, or any other separate covering is needed with lead-covered cable, which can be attached by just plain clips. Soldered-and-taped joints can be dispensed with, if commercial insulated connectors are used, with the added advantage that attachments can be connected to them at any time, and there is no danger of leakage or "shorts." Where two-pin plugs are used, machines and motors can be effectually earthed by means of a bit of bell wire, or bare copper wire, attached to any convenient screw on the frame, the other end being connected to a water-pipe, same way as early radio sets. I hope the above will reassure those correspondents who wrote me on the subject; don't be afraid of Milly Amp, she is your friend and won't play any fancy tricks with anyone who uses ordinary common sense in dealing with her.

Odd Items

A few days ago, time of writing, a new reader who has started on *Maid of Kent* as a first attempt, wanted to know why he couldn't use a small number of ¼-in. stays in the firebox, at about 1½ in. centres, instead of a large number of closely-spaced thinner stays. I've exposed this fallacy several times already; but in case there are any more newcomers to our craft who are of the same opinion, I'll tell them once more, that the area of plate between the stays should be not more than shown on the drawings of the *Maid's* boiler, otherwise it will look like an old-fashioned buttoned cushion when steam is first raised, despite the extra-thick stays suggested. A few minutes' careful thought will reveal the reason. The reproduced photograph, taken at the Vulcan Works by Mr. R. A. Negrete some time ago, shows the staying of a full-sized locomotive boiler; does any beginner imagine for one minute, that the builders would put in such a galaxy of stays, if a less number of larger diameter would suffice? Same applies to the little boilers; nuff sed.

Our good friend Tom Arnott of Ayrshire is putting some really nice fancy work into his *Doris*, as the reproduced photographs will show. The oil pipes to the link trunnion and valve-spindle guides, are made from softened hypodermic syringe "needles," thus giving my oft-repeated advice to "give her a dope of oil," a literal meaning! The link trunnions are hollow, allowing any surplus to lubricate the die-blocks. The sand boxes carry the oil, and pipes are also led from these, to the axleboxes and other moving parts. Tom also did a bit of jerry-wangling inside the smokebox. I specified crossed steam pipes, to make erection easier by eliminating sharp bends, but our friend thought he would have a shot at the bends, so as to get more room for tube sweeping, the coal being none too clean in his locality. He managed it, but it was some job, as the bends turn a 70 deg. angle on a ⅜ in. radius; and it needed two separate lead fillings, and plenty of annealing, before the job was done.

Bob Holmes, a Johannesburg locomotive-builder whose work includes a fine South African Garratt, has a daughter, Judith, who is a real chip of the old block—another "Driver Joy." The reproduced photograph shows how she entertained some friends of contemporary vintage, on the occasion of a party to celebrate her ninth birthday. Bob recently hit an injector puzzle; one that he made, worked O.K. with the cap off the ball-chamber, but dribbled with it in place. The trouble was that something was obstructing the outlet to the overflow; either the cap was blanketing the "entrance to the way out" when screwed home, the combining cone projecting over the lower hole, or the hole not large enough. In full-size practice, if the overflow becomes "furred up," the injector will dribble in like manner.

The Model Power Boat Association

REGATTA LIST—1955

May	22nd	Sp.SR. Forest Gate—at Victoria Park, Hackney, E.9, 11.0 a.m.
,,	28th	RC.SR. Welling—at Belvedere Recreation Ground, 2.30 p.m.
,,	30th	Sp.SR. Bournville—at Valley Pool, Bournville Lane, Birmingham, 11.30 a.m.
June	5th	Sp.SR. St. Albans—at Verulamium, St. Albans, 12.30 p.m.
,,	12th	Sp.SR. S. London—at Brockwell Park, London, S.W., 11.0 a.m.
,,	19th	Sp.SR. Coventry—at Nauls Mill Park, Coventry, 11.30 a.m.
,,	26th	Sp.SR. Victoria—at Victoria Park Hackney, E.9, 11.0 a.m.
July	3rd	Sp.SR. Wicksteed—at Wicksteed Park, Kettering, 11.30 a.m.
,,	3rd	RC.SR. Bromley—at Whitehall Rec. Ground, Bromley, Kent, 11.0 a.m.
,,	10th	Sp.SR. Wallasey—at Central Park, Wallasey, 11.30 a.m.
,,	10th	RC.SR. M.P.B.A. & Victoria—at Victoria Park, Hackney, 11.0 a.m. (M.P.B.A. Radio Control event & Victoria SR.).
,,	17th	Sp.SR. Southend—at Southchurch Park, Southend-on-sea, 11.0 a.m.
,,	24th	Sp.SR. Bedford—at Longholme Lake, Bedford. (Provisionally), 11.30 a.m.
July	30th	SR.RC. St. Albans—at Verulamium, St. Albans, 2.0 p.m.
,,	31st	Sp. M.P.B.A. National Speed Regatta, Verulamium, St. Albans, 12.30 p.m.
Aug.	7th	Sp. Kings Lynn (venue to be announced).
,,	14th	Sp.SR. Southampton—at Ornamental Lake, Southampton Common, 11.30 a.m.
,,	21st	RC. S. London—Brockwell Park, London, S.W., 11.0 a.m.
,,	28th	Sp.SR. M.P.B.A. Grand Regatta—at Victoria Park, Hackney, E.9, 10.30 a.m.
Sept.	4th	Sp.SR. Altrincham—at Lindlow Common, Manchester.
,,	4th	SR. W. London—at The Round Pond, Kensington, 11.0 a.m.
,,	11th	Sp.SR. Blackheath—at Princess of Wales Pond, Blackheath, 11.0 a.m.
,,	18th	SR. Kingsmere—at Rushmere Pond, Wimbledon Common, 11.0 a.m.

Sp—Speed events.
SR—Straight running events.
RC—Radio Control events.

If there are any clubs who wish to hold a regatta and have not yet fixed a date, will they please contact the Hon. Secretary *as soon as possible*.

WITH THE CLUBS

The Society of Model and Experimental Engineers

There will be a meeting of the society at Caxton Hall, Victoria Street, Westminster, at 2.30 p.m. on Saturday, March 19th, 1955, when Mr. J. G. Campbell, a member of the society's track committee, will give a talk on locomotive matters. Visitors are cordially invited to the meeting, the advanced worker equally with the novice, and to make themselves known to the secretary on arrival.

Members are requested to send their subscriptions, not to the secretary, but to the treasurer, R. Lawrence, 1, Hartland Way, Morden, Surrey. The secretary will be pleased to send particulars of the society or to arrange visits to the society's headquarters.

Hon. Secretary: S. L. SHEPPARD, 11, Portland Place, London, W.1.

The Colchester S.M.E.E.

Under the guidance of its very able president, Mr. Carl Sayer, and a most enthusiastic committee, the society is looking forward to its most successful year so far. Projects in hand include the erection of a permanent multi-gauge track, for which a site has been obtained, and completion of *Butch*, the club locomotive, construction of which is well advanced. Improvements to the society's headquarters and workshop are also under way. The portable track is already in great demand for the summer months. These varied activities call for a great effort on the part of every member.

An interesting meeting was held on Friday, February 25th, when Jim Banyard, a member of the society and a railway engineer by trade, gave a talk, "How the Locomotive Works."

Forthcoming meetings are as follow:—

March 25th—"Fire Engines," by C. Sayer.

April 15th—"Film Show," by B.P. & Shell.

April 22nd.—"Railway Signalling," by R. A. Green, signal engineer, Eastern Region. Illustrated with slides and films.

All meetings are held at the society's headquarters, East Bay House, East Bay, Colchester. Anyone interested is invited.

Hon. Secretary: B. DOWNES, "Southernwood," Rowhedge Road, Colchester.

Canterbury & District Miniature Railway Club

The above club is now established, and meetings are taking place on every other Tuesday, our first meeting in April being on Tuesday, the 5th.

The meetings are being held at a restaurant, The House of the White Swan, Northgate, Canterbury, at 7.0 p.m., and anyone who is interested will be most welcome. Meetings so far have covered discussions on types of layouts and motors for "OO" locomotives.

A model building competition for the juveniles is under way.

A trip to the Model Railway Exhibition is being arranged, and it is hoped to make various other outings during the summer.

Hon. Secretary: E. W. MAPLESDEN-YOUNG, Vernon Cottage, Babs Oak Hill, Sturry, Kent.

Worcester & District M.E.S.

A party of Worcester Model Engineering Society members are paying a visit to The British Transport Commission Railway Workshops at Swindon on Sunday, March 27th, 1955. Anyone interested is invited to communicate with the Hon. Secretary: F. L. FUDGER, 23, Camp Hill Road, Battenhall, Worcester.

The Junior Institution of Engineers

Friday, March 18th, at 7.0 p.m. Pepys House, 14, Rochester Row, S.W.1. Informal meeting: Paper—"Some Notes on the Flow of Fluids," by R. F. Twist (South Eastern Gas Board).

Friday, March 25th, at 7.0 p.m. Pepys House, 14, Rochester Row, S.W.1. Ordinary meeting: Paper—"Amateur Telescope Making," by R. D. Gifford, D.Sc., A.M.I.E.E. (member).

Friday, April 1st, at 7.0 p.m. Pepys House, 14, Rochester Row, S.W.1. Film evening.

Midland Section. Wednesday, April 6th, at 7.0 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham. Combined meeting with Newcomen Society—"Machine Tools—Historical Development—Future Trends."

Friday, April 8th, Good Friday.—No meeting.

Friday, April 15th, at 7.0 p.m. Pepys House, 14, Rochester Row, S.W.1. Ordinary meeting—Paper "The Design of, Materials used in and The Manufacture of Pick Steels for Pneumatic Picks," by C. Hutchinson (Associate Member and Durham Bursar).

Private; 3d. per word. Trade: 6d. per word. Minimum 12 words. Use of box 1s. 0d. extra.

THE MODEL ENGINEER

Rates for displayed advertising in this section 35s. per single column inch 1⅞ inch wide.

CLASSIFIED ADVERTISEMENTS

WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

"Acorntools" and "Acorntools" De Luxe 5" s.s. and s.c. lathe, also "Acorntools" 7" stroke high-speed shapers and ½" capacity capstan lathes can be supplied *ex*-stock. Hire purchase terms available. Send for literature and full details to the manufacturers of these machines.—THE ACORN MACHINE TOOL CO. (1936) LTD., 610-614, Chiswick High Road, Chiswick, W.4. Tel.: 3416-7-8-9.

Immediate Delivery from Stock. Myford "M.L.7" and "Super 7" lathes, Grayson, Super Adept lathes, bench planer, shapers, electric motors, small tools.—F. W. KUBACH, 12, Sylvan Road, London, S.E.19. LIV 3311/12.

Whiston for Nuts, Bolts, etc., rivets, 1/32" dia. up, plastic belt, silver-solder, silver-steel, screwed rod, ball-races, etc., Send for 1,000 items list.—K. R. WHISTON, (Dept. M.E.S.), New Mills, Stockport.

Myford M.L.7 Lathe, as new, motorised, 1/3 h.p., a.c. with chuck, countershaft clutch, 4-way toolpost, accessories, standard equipment, £60.—T. WALKER, 72, Draycott Road, Breaston, Derby.

1" MICROMETER For only **10/-** Post & Pkg. 6d.

Measure with accuracy to a thousandth

New British precision instruments. Clear graduations. Adjustable. Decimal equivalents 1/32, 1/64 on stock. Boxed. Instructions, decimal tables. Hundreds sold with repeat orders to M.Es, technical and training schools, etc.

Precision Models Co. See advert
Butts Road, Woking M.E. 30/12/54

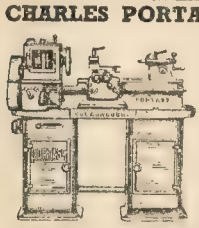
Diadisc diamond lap grinds small carbide and steel tools without heat: 1¼" × ½" face 12s. 6d.; 1¾" × ½" face, 25s. Post 9d.—W. J. MILLETT, C.M.B.H.I., St. Ives, Huntingdon.

Drummond 4" round bed lathe in genuinely first class condition with fitted new Pratt three-jaw and Jacobs drill chucks, £25.—9, Heathlands, Queens Road, Weybridge, Surrey.

Unrivalled in its Class. The E.W. 2½" × 10" lathe. Model "A" plain lathe £13 4s. 0d. Fully convertible to back gear and screwcutting. Can be obtained from 5s. weekly. No interest no fuss credit terms. Details s.a.e.—WANSTEAD SUPPLY CO., 48, High Street, London, E.11.

Rebuilt Lathes. The Acorn Machine Tool Co. (1936) Ltd. offer rebuild to limits "Acorntools" and "Atlas" 10" swing s.s. available. Write—610-614, Chiswick High Road, W.4. (Phone: CHI 3416).

CHARLES PORTASS & SON



5½" 24-speed Gearbox Lathe in two lengths Cast Iron Tray and Pedestals.
Write for Lists Dept. M.E.
BUTTERMERE WORKS SHEFFIELD 8
STAMP PLEASE

M.L.7 on Stand, with motor, chucks, vertical-slide, tools, etc., £45.—Arnold 9161.

High Speed Sensitive Power Bench Drilling Machine. Chuck capacity ⅜", £6 10s. or credit terms 2s. 6d. weekly. Send s.a.e. for descriptive pamphlet.—WANSTEAD SUPPLY CO., 48, High Street, London, E.11.

Lathe Wanted. 2"-3" equipped, good condition, reasonable price. London area.—Box No. 7651, MODEL ENGINEER Offices.

Myford M.L.7 Lathe, ¼ h.p. motor, s/c., independent and drill chucks. Many accessories, tools, castings. Excellent condition. List over £90. Accept £50. Write.—Felcourt Massetts Road, Horley.

Myford M.L.7 motorised, full acces., 6" 4-jaw chuck, 4" 3-jaw chuck, vertical swivelling slide. Offers invited. Details s.a.e.—W. CALVERT, Trefor, Salem Street, Amlwch, Anglesey.

Sale. Drilling Machine, ⅜" Cap. similar to Progress No. 10 £7 10s. Grindturn 2½" lathe, faceplate, four toolpost on base with countershaft, £10 10s.—12, South Terrace, Boothen, Stoke-on-Trent, Staffs.

Holbrook 4" B.G.S.C., with treadle and built on countershaft, on maker's stand, good order, chucks, steadies and all change wheels, £30 f.o.r. Denbigh horizontal miller, floor model; table 20" × 6" auto long feed, one inch arbor and countershaft for three speed flat belt, £30 f.o.r. Would offer both the above in part payment for new Centec Universal with various attachments. HARRISON, Pool Cottage, Randwick, Glos.

"Grayson" Heavy Duty 3½" S.C.C.L. motorised ¼ h.p. 1 ph. 250 chuck, change wheels, driving plate, countershaft, etc. The whole in good working order, £30. No dealers.—'Phone Wordsworth 5915 after 6 p.m.

Myford M.L.7, 1/3 h.p. motor, a.c., 230/250, with chucks, tools, drills, etc., plus standard equipment, very little used, £50 o.n.o.—B. ARNOLD, 6, Abels Road, Halstead Essex.

Overseas Orders Speciality. New bargains reserved for post orders only: B.A. 0-6 socket spanner set, 6/3; drill chucks, No. 1 M.T., ¼", 11s. 6d.; ⅜", 13s. 9d.; ½", 16s. 6d.; Lathe centres No.1 M.T., 4s. 2d.; No. 2, 5s. 3d.; No. 3, 7s. 9d.; drill grinding jigs, ¼", 26s. 5d.; ½", to 1" diam. drills, 73s. 9d.; Moore & Wright, micrometers ratchet locknuts 0-1", 73s., 1"-2", 64s., 2"-3", 70s.; Universal surface gauge, 44s. 4d.; new type 12" spindle, 16s.; drill stands, 1-60, 1/16"-½", A-Z, 3s. 9d. each; spring dividers 5", 5s.; spring inside calipers 6", 5s.; dies 10/16" diam. 40 t.p.i., 5/32", 1/16", 7/32", ¼", each 2s. 9d.; taps 40 t.p.i., 5/32", 1/16", 7/32", ¼", 1s. 10d. each. precision drill chucks, No. 1 M.T., 43s. 6d., No. 2, 44s.; independent chuck 4", 60s.; steel dieholder 13/16", 3s. 3d., 1 1/16", 11s.; Micrometer 0-1", 10s. All best makes above, post free. Drills H.S. set 1-80, 100s.—S. GRIMSHAW, 7, Hall Street, Manchester 18.

3½" Myford B.G.S.C., motorised lathe, chucks, vertical slide, tools, good condition, £26 o.n.o. Also B. & D., ¼" electric drill; drill press; number drills 1-60 as new, £10 o.n.o.—HURLEY, 32, Lawnswood Avenue, Aldersley, Wolverhampton.

In the Workshop, Vols. 1, 2 and 3. M.E. Lathe Manual all new, 21s. post free. ½ h.p. Hoover motor little used, £3. "M.E.s" 1949 to 1954, 12 vols. clean and complete, £1 10s. Buyer collects, London S.W.—Box No. 7657, MODEL ENGINEER Offices.

For Sale, in the North of England, the entire contents of model engineers workshop, including Milne's lathe, watchmaker's lathe, drilling machine, planer, shaper, brazing equipment, grinding machine, power saw, numerous small tools, etc.—Box No. 7658, MODEL ENGINEER Offices.

MODELS AND FITTINGS

Designs for 1" and 1½" scale traction engines. Send s.a.e. for list.—GREENLY AND STEEL, 66, Heston Road, Heston, Middx.

MUSICAL MOVEMENTS ! ! !
For Cig. Boxes, etc., **17/-** each
Also Long Playing Tunes, **25/-** each
S.A.E. for Tune List *2/3 days delivery*
Repairs undertaken
M. MOSS
63, Fontwell Pk., Ashford, Middx

Gauge "1" Three Locomotives, powerful clockwork, 13 coaches, track. Equal new.—BINNS, "Whithens," Filey Road, Osgodby, Scarborough.

Simple Beam Engine grey iron castings, two standards, beam and conrods, 9s., cylinder castings, 12s. 6d. Send 6d. for list.—LUKEN'S-O'-B'ham, 10, Coldbath Road Birmingham, 14.

5" **"Maid of Kent"** excellent performer run only few times, £125. M.L.7 lathe, motorised on cabinet stand complete, chucks, tools, etc., £45. Would exchange both for 7¼" locomotive unfinished job might suit if workmanship good.—Box 7655, MODEL ENGINEER Offices.

Wanted. Large Tender or Parts to build. One or two sets of points, signal, coach bogies, all 7¼" gauge.—28, Gilbert Road, St. George, Bristol, 5.

Steam Locomotive and Tender (paraffin) 2½" gauge. Needing slight attention, 35s. MACGREGOR, 7, Milverton Road, Knowle.

EX GOVT. BARGAINS
Lightweight 230 v. AC/DC F.H.P. MOTORS. Length 4½ in., dia. 2½ in., mounting flange 3½ in. dia. Shaft ⅜ in. dia. × ⅝ in. projection. Converted from hand generators. Excellent for models, whisks, fans or any purpose where only moderate power required. Wonderful value at 18/6, post 1/6. 3d. stamp for illus. list of Motors, Transformers, Switches, &c. Money Back Guarantee.
MILLIGAN'S
24 Harford Street, Liverpool, 3

ELECTRICAL

A.C. Motors, Delco Capacitor, start induction, 200/250 V, 50 cycles, 1 phase, 1,425 r.p.m., ½ h.p., £3 12s. 6d.; 1/3 h.p. £4 17s. 6d., ¼ h.p., £6 10s. 0d. Perfect and guaranteed. Passenger carriage, 5s.—JOHNSON ENGINEERING COMPANY, 319, Kennington Road, S.E.11. Reliance 1412/3.

House Service Meters, 220/250 V, (a.c. or d.c.). Credit or prepayment type.—UNIVERSAL ELECTRIC CO., 220, City Road, London, E.C.1.

Electric Motors, generators, starters, ⅛ to 40 h.p., a.c. or d.c., 100-350 V, switches, cables, electric tools. Exchanges.—VERNON SMITH LTD., 354/366, King Street, London, W.6. RIV 3964.

Banner Battery Chargers direct from makers, 2-6 and 12 volt with meter, 1 A. £4 10s., 2 A, £5 10s., 4 A, £7 10s. Good quality. Write for leaflet. Cash or C.O.D., post free.—THE BANNER ELECTRIC CO. LTD., Hoddesdon, Herts.

SITUATIONS

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

Mechanics for Instrument and camera servicing, able to make small parts. Knowledge of photography preferred. Initial training given. Interesting, clean work. Apply to—TECHNICA CAMERA, LTD., 21, William IV Street, W.C.2. TEMple Bar 9547.

Mechanic Required to make small electro-mechanical apparatus for use with electronic equipment. Adaptable and able to work from rough sketches. Good working conditions and interesting work. Salary according to age and experience. Applications to—THE SECRETARY, The National Hospital, Queen Square, London, W.C.1.

Turner Required with good experience for small batch production and special work. Permanency for right man with old established firm. Apply—WATKINS & WATSON LTD., 17, White Lion Street, Angel, Islington, N.1.

St. Thomas' Hospital, London, S.E.1. Senior technician and technician required for physics workshop engaged in design and construction of prototype instruments and research apparatus. Previous experience in general workshop practice essential, preferably in connection with physical or medical research work. Some knowledge of electronics desirable. Salary: senior technician £540 × £20(3) × £25(1)—£625. Technician £450 × £15(3) × £20(1)—£515. London weighting under age 21 £10; 21 to 25 (£20); 26 and over £30 per annum. Applications to—PERSONNEL OFFICER.

Laboratory Mechanic Required for maintenance of mainly physical laboratory apparatus and the construction of original testing equipment—glass blowing experience not essential. Good oportunity for a keen model maker. Retired man would be considered with reduced hours. Apply—WORKS DIRECTOR, B. WINSTONE & SONS LTD., Park Works, Park Lane, Harefield, Middx.

GENERAL

"Spraying Handbook" 1950 ed. Car, caravan, industrial, domestic stoving, flock leather spraying, 3s. 6d. post free.—LEONARD BROOKS, 25, Harold Wood, Romford.

Compressor Equipment, miscellaneous items, etc., catalogues, 1½d.—PRYCE, 157, Malden Road, Cheam.

Build Your Own Refrigerator. All components available at reasonable prices Frigidaire, "Flowing Cold," units, £5; small single-cylinder units. Kelvinator, etc., £4; ¼ h.p. heavy duty motors, £3. Chrome cabinet fittings new, £1 set. Money back guarantee. S.A.E. for lists and schematic diagram.—WHEELHOUSE, 1, The Grove, Isleworth, Middx. Hounslow 7558.

SEE
WHISTONS
Half Page Advert
LAST WEEK ?

Watch and Clock Lathes, cleaning machines, staking tools, etc. (Large illustrated catalogue, 1s. 6d. p.p., price list 1s. 1d. p.p.) Stop watch and chronograph repairs and materials for the trade. Special offer. New (slightly soiled) 2½" Burnerd 3-jaw (reversible) scroll chucks, £3 11s. 9d. post paid. (Used 6, 6½, 8 and 10 mm. lathes bought, sold and part exchanged). Easy payment terms available.—JOHN MORRIS (CLERKENWELL) LTD., 64, Clerkenwell Road, London, E.C.1.

Immediate Capacity. Light turning, fitting and assembly. Special machines and prototypes designed and constructed. Moderate charges.—CANONBURY ENGINEERING Co., 283, Essex Road, London, N.1. (CANonbury 6256).

ANTI-RADAR STRIP DISPENSER UNITS
These comprise 2 1/20th h.p., 24 V shunt wound motors, with train of gears, both 25 and 50 to 1 reduction. The unit is mounted in an aluminium chassis and consists of over 100 gears, pinion shafts, etc., of the Meccano pattern, with variable speed switch and indicator light, bag of spares, and electrical diagram. These are all new and in original waterproof packages. They are something entirely new and have never been offered before PRICE 30/- each. CARR. PAID.
H. MIDDLETON, 639, Abbeydale Road, Sheffield, 7.

Compressors for Sale. Twin pistons complete with air receiver, driving wheel and motor cradle, 180 lb., 2½ cu. ft., price, £3. Also 8 cu. ft. compressor only, £5. Motors a.c. and d.c. all types, ¼ h.p., £3. Carriage forward.—WHEELHOUSE, 1, The Grove, Isleworth, Middx. Phone: Hounslow 7558.

Mild Steel, Aluminium and alloy, brass, tool-steels, castings, etc., widest range, 4-way toolposts, from 1⅛" square, 6d. lists.—SYNEK, 73, Sherbrooke Road, London, S.W.6.

Air Compressor Units, 2½ to 18 cu. ft., 100 to 800 p.s.i. from £4 17s. 6d. Stationary and mobile plants from £16 17s. 6d.—Below.

Air Tanks and Accessories at approximately 50 per cent. off lists.—Below.

TV Generators and Lighting Sets "Chorehorse" BD-12-A, £47 10s. 0d. "Onan" relays starting from £37 10s. 0d. "Homelite" £35 0s. 0d., etc., all with d.c. output. Straight d.c. lighting sets "Delco" £16 10s. 0d. Johnson "Chorehorse," £25. "Homelite" 24 V, 2,000 watts, £27 10s. 0d. —TEDDINGTON ENGINEERING CO. LTD., Dept. G., 29/31, High Street, Teddington, Middx. KINgston 1193.

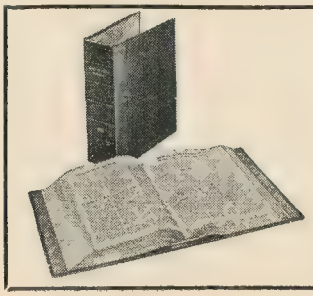
Guaranteed! Easy home constructed refrigeration. Genuine domestic components. Not second-hand ice cream scrap. Modern hermetic G.E.C. units. Gas, electric and oil silent units. Everything for refrigeration. Complete specialists. Send s.a.e. for free illustrated "Sealed-System" leaflet or 1s. for complete catalogue (refunded with first order).—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Phone: Wallington 9309.

60 Items for Sale. S.A.E. please. "M.E.s" 1946-52, 337, mint, offer.—"Lyndhurst," Murdoch Road, Wokingham.

Engineering Works Engaged in Light Precision and allied engineering would like to conclude an arrangement with British company for the manufacture and marketing of their products in Africa, such as models, toys, instruments, etc. Replies to—MANAGING DIRECTOR, P.O. Box 21, Belgravia, Johannesburg, South Africa.

Wanted. Camera Tripod, meter, enlarging equipment, binoculars.—TAYLOR, 10, Queen Street, Bridlington.

Musical Mechanisms. Swiss made for fitting in cigarette boxes, etc., 17s. each. Send s.a.e. for complete list of handicraft materials.—METWOOD ACCESSORIES, Dept. M.E., Church Street, Wolverton, Bucks.



EASIBINDERS
for "THE MODEL ENGINEER"
Bind your issues in the Easibinder. By a simple operation the journals are inserted with a steel wire, and at once become a neatly bound volume for the Bookshelf.
The Easibinder is bound in green cloth, and gold-blocked with title and year on the spine. It will hold 26 issues (One volume) and is available for all previous years, large and small issues, including 1954 and 1955. PRICE 10/- (Post Paid)
When ordering please state which year is to be blocked on the binder (two binders for each year are necessary, viz., Jan.-June and July-Dec.)
EASIBIND LTD
84, NEWMAN STREET, LONDON, W.1

1,000 H.S. Slitting Saws, 2¾″ dia., 1″ hole, .011″, .019″, .021″, .024″, .027″, .029″, .039″, .040″, .056″ thick. Actual value 10/- each, clear 3/9 each. Six ass. £1.

1,500 H.S. Morse Taper Shank Twist Drills. Brand new, Firth Speedicut, Balfour Capital, etc. This is an opportunity to secure a really good range of sizes at about a quarter of fractional size cost. No. 2 Morse Shank, 14 mm., 4/6. 16 mm., 5/-, 17 mm., 5/6, 17.5 mm., 18.5 mm., 6/- each. 19 mm., 20 mm., 20.5 mm., 21.5 mm., 6/6 each. 22 mm. and 23 mm., 7/- each. No. 3 Morse Shank, 23.5 mm., 24 mm., 24.5 mm., 8/- each. 26 mm., 26.5 mm., 9/- each. 27 mm., 27.5 mm., 10/- each. 28 mm., 29 mm., 29.5 mm., 11/- each. No. 4 Morse Shank, 40 mm., 30/- each. We strongly advise our clients to secure a stock as early as possible.

500 H.S. Long Straight Shank Twist Drills, 3/64″ to 7/64″ dia., 4″ to 6″ long, 3 ass., 5/-. Also 7/32″ to ⅜″ dia. 6″ to 7½″ long, 3 ass., 7/6. Also .2″ dia., 10″ overall length, 8″ flute length, worth 15/- each. Clear 4/6 each. These are very useful stock.

80 Only. H.S. Slitting Saws. 4″ dia., 1″ hole, 3/32″ thick, 6/- each. Also 7″ dia., 5/32″ thick, 1″ hole, 17/6 each. Also 8″ dia., 3/32″ thick, 1″ hole, 20/- each.

500 H.S. Side and Face Cutters, thin type, 5″, 6″, 7″ and 8″ dia., all with 1¼″ holes, 3/32″, ⅛″, 5/32″, ³⁄₁₆″, 7/32″, ¼″, ⁵⁄₁₆″ thick. Price list on application.

This is a H.S. Milling Cutter Bargain. All 1″ bore, 3″-3½″ dia., ⅛″-⅜″ thick, including side and face cutters, plain and angle cutters. A most useful lot for any tool room, 6 ass. for 50/-. The present maker's price of the cheapest cutter in this selection is 40s. You must get this lot, remember you get same on approval against cash.

300 H.S. Counterbore Drills, 13/32″ dia. pilot drill, ⅞″ counterbore drill. No. 1 M.T. shank, 7/6 each.

350 Interlocking Cutters, side and face, 3″ dia., 1″ hole, ¾″ wide. Two separate cutters, bargain 20/- pair. Actual value £5.

2,000 Small H.S. Twist Drills, approx. 1/32″-3/32″, 4/- doz. approx.; ⅛″-¼″, 7/6 per doz. approx.; 9/32″-15/32″ six for 10/-.

All items brand new. £1 orders post paid. Prompt delivery. Inspection by appointment only. All items sent on approval against cheque or P.O. Refund without question if any item returned.

3,000 Circular Split Dies 1″ dia. cutting ¼″, ⁵⁄₁₆″, ⅜″, ⁷⁄₁₆″, ½″ Whit., B.S.F., also brass thread, 26 thread all sizes and American N.F. 12/- per set of 5 sizes, 2 sets 22/6, 4 sets 42/6. Taps to suit 9/3 per set, either taper or second or plug. 1″ die-stocks 5/- each; ³⁄₁₆″ to ½″ tap wrenches 12/6 each.

1,000 Hand Reamers, ⅛″ and ⅜″, 3/6 each.

1,000 High Speed Inserted Blades Expanding Reamers, 17/32″ to 19/32″ 14/-, ⅝″ to ⅝″ 16/-, ¹¹⁄₁₆″ to ¾″ 17/6, ⅞″ to 31/32″ 18/6, 31/32″ to 1⅛″ 22/6 each.

1,000 High Speed Parting Off Tool Blades, Eclipse brand: ¹¹⁄₁₆″ × 3/32″ × 5″ long, 5/- each; ¹³⁄₁₆″ × ⅛″ × 6″ long, 5/- each; ¹³⁄₁₆″ × 3/32″ × 6″ long, 6/- each.

7,000 Pratt & Whitney, circular split dies, superior quality precision ground cutting edges, ⅜″ dia., suitable for machine or hand use. Sizes: 2, 4, 5, 6 B.A., 8/6 per set.

5,000 Ball Races, ⅛″ bore, ⅜″ o.d., ⅛″ thick, 4/- pair; ¼″ bore, ½″ o.d., 7/32″ thick, 4/- pair; 6 mm. bore, 19 mm. o.d., 6 mm. thick, 4/- pair; 9 mm. bore, 26 mm. o.d., 8 mm. thick, 4/- pair; ⅜″ bore, ⅞″ o.d., 7/32″ thick, 5/- pair.

4/9 Any LOT. Five lots 22/6. 2 H.S. Tap or Reamer Fluting Cutters 1¼″ dia., ⅝″ hole, ⅛″ and ⁵⁄₁₆″ thick, worth 7/6 each. Set 5/32″, ⅛″, 7/32″, ¼″, all in 40 thread, ⁴⁵⁄₆₄″ Split Dies: 8 assorted Centre Nail Pin and Belt Punches, total value 12/6; one H.S. Tap or Reamer Fluting Cutter, 2¼″ dia., ⅜″ thick, ⅞″ hole; one ⅝″ H.S. Hand Reamer, worth 10/-. Every item a good bargain.

500 Sets Metal Figure Punches, nine punches 0 to 8, the six is used reverse for nine; size 5/64″ 6/6 set, worth 15/-; ditto ⅛″ size, 8/6.

2,000 Files, 4″ to 6″ flats, half-rounds, rounds, squares, warding assorted, cuts, good general lot, 10/6 doz.; three doz. 28/6.

600 Circular Split Dies, B.T.D. make 2¼″ dia., ⅝″, ¾″, ⅞″, 1″ Whit., ⅜″ Gas; worth 11/- each. Clear 7/6 each, new 2¼″ die-stock to suit, worth 30/- each, clear 10/- each.

200 Boxes A to Z Steel Letter Stamps for marking metal 5/64″ size, 17/6 set; ditto ⅛″ size, 22/6 set, worth treble this price.

2,000 Straight Shank End Mills, size ⅛″, 5/32″, ³⁄₁₆″, 7/32″, ¼″, ⁵⁄₁₆″, list price 30/- set, handy bargains, 15/- set, also ⅜″, ½″, ⅝″ ditto 12/6 set, all in makers' wrappings.

500 H.S. 90° Countersinks, body ⅛″ dia., teeth cut to point. An essential tool for any workshop using c/s screws. Gift 5/- each.

1,000 Bevelled Wood Chisels, handled, ¼″, ⁵⁄₁₆″, ⅜″, ½″, ⅝″, ¾″, ⅞″, 1″. Actual value 37/6. Gift 25/- set.

3,000 High Speed Routing Cutters, straight shank, two lip, as used for cutting slots in wood, sizes ⅜″, ½″ dia., clear 4/- each.

1,000 Toolmakers' Needle Files, good assortment of shapes and cuts, worth 1/9 to 2/6 each, 12/6 doz.

200 Ace Dial Gauges. 2½″ face, reads to 0.001″, plus and minus, very useful instrument, worth 60/-, gift 45/-.

300 High Speed Straight Shank End Mills, ⅞″ dia., 10/- each.

10,000 High Speed End Mills Straight Shank, 3/32″ to ⅝″ dia., some with teeth cutting both end but not standard sizes, clear 5 assorted, 10/-.

200 Cast Steel Circular Saws for Wood, 4″ dia., 6/- each; 6″ 10/-; 8″, 13/6; 10″, 18/-; 12″, 24/-. Larger sizes. Prices on application.

100 doz. 6″ Three Square Saw Files, 10/6 per dozen.

1,000 H.S. Taper Pin Reamers, 7/32″ size, 5/- each, also Nos. 5, 6, 7, 8, 9, 10, 5/- each. 30/- set of 7.

500 H.S. Angle Cutter as used for milling teeth in slitting saws and milling cutters. Actual value £3 each. 2½″ dia., 1″ hole. Clear 25/- each.

400 H.S. Milling Cutters and Angle Cutters, 1½″-2″ dia., ⅝″ hole, 4 ass. 22/6. Useful bargain.

100 H.S. Slotting Cutters, 5″ dia., ³⁄₁₆″ thick, 1″ hole, 12/6 each.

1,000 Semi High Speed Centre Drills, Slocombe brand, ⅛″ body dia., 3/32″ point, 1/6 each, 16/6 per doz.

20,000 Small High Speed Milling Cutters, various shapes and styles. We want to clear these quickly, 12 assorted 15/-.

800 Small Rotary Files, 3/32″ shanks, various type heads, another clearance line, 4/9 per doz.

200 Large Expanding Reamers, 3 ¹⁵⁄₁₆″ to 3⅞″ capacity; 4″ overall length, micrometer index, worth about £10 each. Ten super high speed blades, a gift 10/- each, cheap enough to use the blades as toolbits and make the body into expanding mandrel. Postage 2/- extra for this item even with £1 order.

500 Carborundum Grinding Wheels, 6½″ dia., ½″ thick, 1″ hole, suitable for drill or tool grinding, 3/9 each, three for 8/6, cheap enough to bush to suit your spindle; postage 2/- extra. Also 5″ dia. cup wheels, ½″ hole, 4/9 each.

300 High Speed Gear Cutters, 2½″ dia., 1″ hole, d.p. 48, No. 1; d.p. 36, No. 3, 6; d.p. 28, No. 3, 5, 6, 7; d.p. 26, No. 1, 6, 7; d.p. 22, No. 5, 7; d.p. 14, No. 2; d.p. 11, No. 2; £1 each, six for £5.

2,000 High Speed Toolbits, ³⁄₁₆″ round, 3″ long, 8/6 doz.

500 High Speed Straight Shank Twist Drills, Long Series, ⅝″, 27/32″, 1 ⅛″ dia., honestly worth 50/-, clear 12/- the three postage 2/- extra.

J. BURKE, 192 Baslow Road, Totley, Sheffield

Inspection Only at Rear 36 Fitzwilliam St., Sheffield

THE MODEL ENGINEER

CLASSIFIED ADVERTISEMENTS

- PRIVATE RATE 3d. A WORD
- TRADE RATE 6d. A WORD
- MINIMUM 12 WORDS
- BOX NUMBER 1/- EXTRA

To "THE MODEL ENGINEER" Classified Advertisement Dept., 19-20, Noel Street, London, W.I

Please insert the advertisement below under

heading.....for.....insertions

Name .....

Address .....

.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

Three insertions for the price of two. ★ Private advertisers only.

Please write in block letters. REMITTANCE VALUE ..... ENCLOSED

Printed in Great Britain for the Proprietors by ELECTRICAL PRESS LTD., Cordwallis Works, Maidenhead, Berks, and published by PERCIVAL MARSHALL & CO. LTD., 19-20, Noel Street, London, W.1.
Registered for transmission by Magazine Post to Canada including Newfoundland.

SUGGESTIONS for YOUR WORKSHOP . . .

	Deposit	12 monthly payments
WOLF CUB ¼" electric drill **£5 19 6** ...	**29/6**	**8/3** p.p.
BLACK & DECKER ¼" Utility drill **£5 19 6** ...	**29/6**	**8/3** p.p.
BRIDGES ¼" electric drill **£7 10 0**	**35/-**	**10/6** p.p.
Accessories for the above may be added and we shall be pleased to quote for your requirements.		
BLACK & DECKER 5" SANDER POLISHER **£8 7 6**	**40/-**	**11/8** p.p.
MYFORD P.R.11 PLANER with roller extension arms **£20 7 6**	**100/-**	**28/2** car. pd.
COUNTER SHAFT CLUTCH UNIT with new swing head for MYFORD M.L.7 LATHE **£6 10 0**	**30/-**	**9/2** p.p.
DIVIDING ATTACHMENT FOR M.L.7 lathe **£14 0 0**	**70/-**	**19/3** car. pd.
MYFORD VERTICAL SLIDE swivel type **90/-** plus MACHINE VICE **18/6**	**27/6**	**7/5** p.p.
BURNERD 4" 3-jaw G.S. "GRIPTRU" chuck **£9 17 0**	**47/-**	**13/9** p.p.
		8 monthly payments
MECCO ALL ELECTRIC SPRAY GUN **75/-** ...	**15/-**	**8/3** p.p.
I. & G. ELECTRIC SANDER POLISHER **75/-**	**15/-**	**8/3** p.p.

A 1/- stamp will bring you a copy of our comprehensive illustrated catalogue with details of blueprints, castings and materials for many "L.B.S.C." designed small steam locos ; workshop equipment, etc.

"The choice of experience"

A. J. REEVES & CO

416 MOSELEY ROAD, BIRMINGHAM, 12

Grams : "Reevesco, Birmingham" *Phone : CALthorpe 2554*

The new 1955 model LESDIX Crystal Set

in brown bakelite case as illustrated. The coil is Litz wound on paxolin formers and tapped for long or short aerial; variable solid dielectric condenser. Crystal Diode needing no adjustment. Sockets for aerial, earth and headphones. All sets aerial tested and working well. Complete with headphones with headband, cord and plug, price **30/-**, post 2/6.

Morse Practice Sets. Ideal for learning Morse. Comprise service type Morse Key, beautifully balanced for correct touch, buzzer, space for battery and terminals on polished wood base, wired ready for use, **6/6** post 1/6. Morse Key only, Air Ministry type with back and front contacts, **4/6** post 1/-. Practice Buzzer in bakelite case, **3/6** post 9d. Single phone with headband and cord, **3/6** post 1/-.

Tungar Battery Chargers. 110 volts or 230 volts a.c. input 75 volts, 6 amps. For charging 1-12 six volt batteries at 6 amps. New and fitted new Tungar valve, **£22 10s.** for 110 volts, or **£25** for 230 volt input.

Motor Starters. Enclosed pattern, for 220 volts up to 1½ h.p. motors, **30/-** post 3/6.

Flexible drives. For small motors 7 ft. long with ⅜ in. sq. both ends, **5/6** post 1/6.

Nife Batteries. New and uncharged, surplus, 12 volts 45 ampere hours in wood crate, **£12 10s.** carr. 10/-. Single 1.2 volt 45 a.h. cells, **30/-** post 2/-.

Sewing Machine Motors. New 230 volts a.c. with fixing bracket for any ordinary domestic machine. Foot control and needle light, **£6 10s.** Fully guaranteed. Write for leaflet.

Periscopes. Ex W.D. beautifully made precision instruments each in aluminium case 3½ in. by 4½ in. by 1½ in. Fitted angle prism. Price per pair **6/3** post 1/9. Can easily be extended to height required by wood or metal strips.

G.P.O. Counters. Electro magnetic type d.c. coil, counting to 9999, **5/-** post 1/-.

ELECTRADIX RADIOS

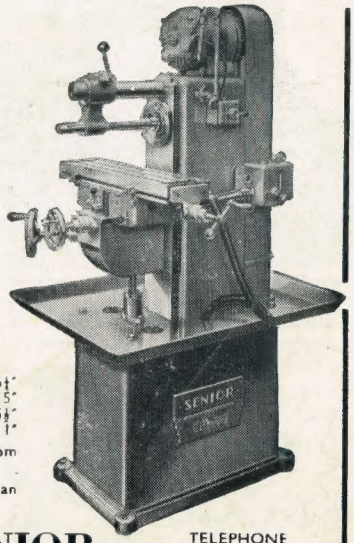
Dept. D. 214, Queenstown Road, Battersea, London, S.W.8

Telephone : MACaulay 2159

BRITISH BUILT MILLER *of the Highest Class*

This is a Precision Miller, built to fine limits. In addition to the high grade craftsmanship special care is taken in the painting work. All castings are carefully filled, and rubbed down before the final oil resisting paint is applied. Hand wheels, levers, etc., are bright chromium plated, resulting in a superbly finished machine. Micrometer Collars have matt finish with black waxed markings for easy non-dazzle reading.

Outstanding Value
Price including 1 horse-power motor, Brook push-button starter, suds pump and cutter arbor **£260 0 0**



MODEL M.1

Table	25" x 6¼"
Table travel	15"
Cross feed	5⅛"
Vertical feed	11"

12 Spindle speeds . . . from 50 to 1.660 r.p.m.

Full range of accessories can be offered

TOM SENIOR

LIVERSEDGE, YORKS., ENGLAND

TELEPHONE Cleckheaton 547
TELEGRAMS: Senior, Cleckheaton 547

If further interested write for Brochure fully describing the machine with its range of attachments

---

"MARLCO" KNURLING TOOL

AS SHOWN

£5 17 6

Range 0-4 in. All steel case-hardened. Can be assembled to operate in front or behind work. Will exert great pressure without strain to light lathe. Floating jaws will follow workpiece and enable knurling to be started in its middle.

Diamond and Straight Knurls available.

Full particulars on request

W. H. MARLEY & CO. LTD.

(M.E. Dept.), New Southgate Works
105, High Road, LONDON, N.11.

Telephone : ENTerprise 5234/5578